

Meta-analysis on school level variables in a co-evolving network analyses of adolescent friendship and smoking behaviour

McAneney, H., Cochrane, G., Higgins, K., McCann, J., & Kee, F. (2014). Meta-analysis on school level variables in a co-evolving network analyses of adolescent friendship and smoking behaviour. 354. Poster session presented at XXXIV Sunbelt Social Networks Conference of the International Network for Social Network Analysis (INSNA), St Pete Beach, United States.

Document Version:

Publisher's PDF, also known as Version of record

Queen's University Belfast - Research Portal:

[Link to publication record in Queen's University Belfast Research Portal](#)

Publisher rights

Copyright the authors 2014.

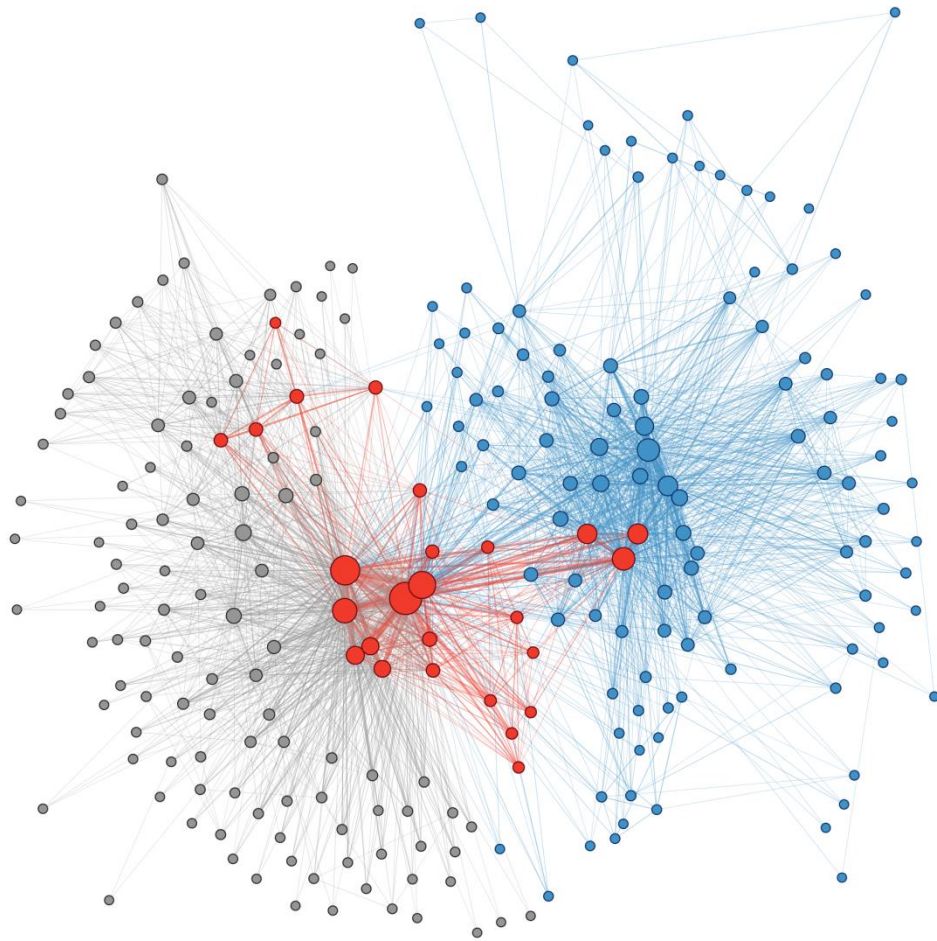
General rights

Copyright for the publications made accessible via the Queen's University Belfast Research Portal is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy

The Research Portal is Queen's institutional repository that provides access to Queen's research output. Every effort has been made to ensure that content in the Research Portal does not infringe any person's rights, or applicable UK laws. If you discover content in the Research Portal that you believe breaches copyright or violates any law, please contact openaccess@qub.ac.uk.

Abstracts for Sunbelt XXXIV



International Network for Social Network Analysis

TradeWinds Island Resorts, St. Pete Beach, FL

February 18 - 23, 2014

2-Mode Networks WED.PM1

2-Mode Networks WED.PM1

Communities in Multi-Mode and Multi-Level Networks: Some Insights from Synthetic Data

David Melamed, University of South Carolina, Department of Sociology

Contact: dmmelamed@gmail.com

The literature on discovering communities in networks, or densely connected subsets of vertices within the network, has exploded in the past decade (Fortunato, 2010). Almost all of this research, however, identifies communities in one-mode networks (e.g., person-to-person networks). Very little research has examined the identification of community structures in multi-mode or multi-level networks (c.f., Barber, 2007; Mucha et al., 2010; Melamed et al. 2013). In an effort to address this shortcoming in the literature, we describe how to generalize three commonly used algorithms for the identification of communities in one-mode networks to multi-mode and multi-level networks: Girvan and Newman's (2002) betweenness-based algorithm, Newman's (2006) spectral partitioning, and simulated annealing (e.g., Kirkpatrick 1984). To evaluate the algorithms, we rely on extensive network simulations. Results of the simulations reveal that spectral partitioning does not perform as well as the other algorithms. Results also indicate that the algorithms are more effective on denser networks – having more information to exploit aids the identification of the underlying community structure. We conclude with a discussion of directions for further research, including other community detection algorithms that would benefit from generalization to multi-mode and multi-level networks.

2-Mode Networks WED.PM1

Professions as skill structures: Institutionalizing knowledge of data science

Philipp Brandt, Columbia University

Contact: psb2120@columbia.edu

This study explores the relationship between skill densities and the emergence of professions. A method is developed using skills mentioned in job descriptions that are representative of a certain profession. These skills serve as features in a logistic classifier that is trained to identify job descriptions mentioning skills of a certain profession regardless of the specific title. This method is applied to a series of cases, including the canonical cases of legal and social work,

medicine, and the pseudo--profession of project management. The method achieves a precision of around 90 to 95 percent for proper professions, but much lower scores for pseudo-professions. These results confirm theories differentiating expert work from other types by having a formalized knowledge base. The proper professions are then transformed into a position--skills co--occurrence network to analyze the meso--structure of expert knowledge. "Data science" is studied as the focal case of successful professionalization. It is compared to legal work as the baseline and risk analysts as counterfactual case. Community detection analyses indicate similar modularity scores for all cases, but accounting for densities within and between concrete clusters reveals higher centralization of failing professions and closure in the case of successfully institutionalized and institutionalizing professions. This study contributes a new methodological strategy that overcomes existing limitations to quantitatively study professional labor with traditional data by proposing a classifier for unstructured data. Substantively, block models show that the informal knowledge structure of a profession varies independent of it's degree of formal organization.

Centrality in Social Networks WED.PM1

Centrality in Social Networks WED.PM1

Defining Network Positions

Ulrik Brandes, University of Konstanz

Contact: ulrik.brandes@uni-konstanz.de

As part of a grander scheme to advance the methodology of network analysis, a precise notion of position is proposed. The definition is sufficiently general to integrate a range of network-analytic concepts (e.g., social capital, centrality, role, or brokerage) into a framework of positional comparison. Since they are retained as special cases, previous methods are not replaced but related in novel ways, with certain gaps filled in. By explicating otherwise hidden assumptions and unwitting decisions, the framework also points to the loci for substantive theory and interpretation fallacies. Examples demonstrate that, despite its abstract look and feel, the approach is rather practical.

Centrality in Social Networks WED.PM1

Growth, Stability, Change and Inequality in Dynamic Ego Networks

David Hachen, University of Notre Dame, Omar Lizardo

Contact: dshachen@gmail.com

It is well-known that in social networks there is inequality in vertex degree with some people having much larger ego networks than others. However there is debate about how such inequalities emerge and why some people have more social ties than others. With fine-grained temporal data on the formation and decay of social ties, we distinguish between four ego network traits related to degree: cumulative degree, effective degree, active degree, and churn. After conceptually and operationally distinguishing between these four traits, we focus on effective degree, the number of people a person could interact with at a given point in time. Using behavioral data on social ties gathered from analyses of communication events (texts and voice calls) of 161 students during their first academic year at the University of Notre Dame, we map out how student's ego networks involving other ND students grow, stabilize and change over 39 weeks. Analyses reveal that (1) after an initial growth period, effective degree stabilizes, (2) when it stabilizes, effective degree evidences inequality, and (3) the most important predictor of this inequality is how outgoing a student is, measured by an extroversion scale administered prior to a student's arrival at ND. These findings call into

question preferential attachment models of growth in vertex degree that stipulate that inequality in degree occurs through an endogenous popularity tournament process. Instead an exogenous factor, a person's capacity to be sociable, predicts initial effective degree, and because effective degree is fairly stable, a student's effective degree at the end of their first academic year.

Centrality in Social Networks WED.PM1

Some properties and extensions of PN centrality

Martin Everett, University of Manchester, Stephen Borgatti

Contact: martin.everett@manchester.ac.uk

Recently Everett and Borgatti have proposed a new centrality measure, PN centrality for networks that contain positive and negative ties. We examine the performance of PN centrality and give extreme examples which highlight its potential. In addition we look at some of the parameters that are fixed to normalize the measure and suggest alternatives which may prove useful for different types of data. Finally we suggest some related alternatives which are part of the same family but use different underlying assumptions.

Centrality in Social Networks WED.PM1

Subgroup Centrality: Methods and Examples

Jocelyn Bell, United States Military Academy

Contact: bell.jocelyn@gmail.com

In a social network consisting of nodes with different attributes or community groupings, identifiable subgroups emerge that intra- and inter-relate. We present a method for calculating centrality measures with respect to subgroups defined by these nodal attributes. For example, using the attribute of sex, we can ask questions such as "which women are most influential over the men?" or "which men help sustain the communication of the group of women?" Often, traditional centrality measures fall short of answering such questions. Our subgroup centrality measuring method uncovers previously hidden network features, as evidenced by our discussion and analysis of a classic social network.

Collective Actions and Social Movements WED.PM1

Collective Actions and Social Movements WED.PM1

Unified Quest Participant Selection: A Network Approach

Louis Boguchwal, Network Science Center at West Point, Zachary Langhans

Contact: Louis.Boguchwal@usma.edu

The United States Army frequently conducts war-games and thought-exercises to predict and evaluate the future of warfare. Specifically, Training and Doctrine Command (TRADOC) coordinates this effort with its Unified Quest program. As war-games are costly and impact strategic decisions, it is imperative that participants are chosen with great care. Our team applies social network analysis techniques to select applicants that optimize war-game objectives as a group. We translate a network of participants into a network of attributes. When a participant is selected, she brings not only her individual skills and characteristics, but also her experiences with other members of the group. Thus, participants are inherently connected before a war-game takes place. Of all the connections formed, a particular subset might be of interest based upon its implied attributes and interactions. We elicit these preferences from the Army Capabilities Integration Center (ARCIC), and design optimal network structures that reflect these requirements. Preferences are represented with parameters that dictate network structure. Additionally, network designs are constrained by the number of slots available, as well as the complementary and conflicting nature of various attributes. This network-design problem is equivalent to selecting an optimal sub-graph subject to the above constraints. Our algorithm is a work in progress. This method determines the optimal attribute network, and then reports individuals possessing those attributes, whom we ultimately recommend for participation in the war-game.

Collective Actions and Social Movements WED.PM1

A Tale of Two Social Movements: Interaction Dynamics, Roles, and Content

Emma Spiro, The Information School, University of Washington, Andrés Monroy-Hernández

Contact: espiro@uw.edu

In this paper we investigate a new type of social movements; these movements have a large presence on social media and have been theorized to adopt a distributed participation framework. Here, we focus on two core questions: (1) what are the roles of organizations and individuals over the course of the movements? and (2) how do interactions among participating

actors change as the movements grow and eventually die? We examine these questions using as case studies the #YoSoy132 student uprising in Mexico, and the “bus rebellion” in Brazil. Using a large-scale dataset of social interaction on Twitter, we identify key roles in the interaction structure over time using network centrality measures. Preliminary results indicate that although individuals are prominent at the birth of the movements, these individuals fade as the movement dwindles and organizations take over, occupying the most central positions in the network of Twitter interaction. We also consider the dynamics of the interaction network over time using distance-based methods for graph comparison, identifying key time points with unique social structure. We find that these time points often map to exogenous events such as coordinated protests in physical locations. Our results have important consequences for the continued visibility of such social movements as well as the ability of these movements to attract continued participation by both individual and organizational actors over time.

Collective Actions and Social Movements WED.PM1

Actors, events, and networks: A Multilevel ERGM of social movement organizing

Andrew Pilny, University of Illinois Urbana-Champaign, Yannick Atouba

Contact: apilny2@illinois.edu

The recent network paradigm in social movement (SM) research suggests that SMs are constituted and sustained through complex networks among (and between) actors and events. As such, a comprehensive understanding of social movement organizing requires a multilevel examination of the relationships among and between social movement actors and events. However, due to a variety of reasons, there is currently no research that has provided such a comprehensive multilevel examination of social movements. In this study, we introduce a new way of conceptualizing SMs as networks of communication episodes that inherently requires a multilevel analytical framework and we use ERGM for multilevel networks (Wang et al., 2013) to examine collective action in the 1980s U.S. national labor policy domain. As such, we construct and analyze a multilevel network consisting of three levels: Actor by Actor: Communication between social movement organizations (Micro-level) Actor by Event: Participation by social movement organizations in different collective action events (Meso-level) Event by Event: Collective action events linked through their shared symbolic meaning (Macro-level). Our preliminary results suggest two key findings regarding organizing in the 1980s U.S. national labor policy domain. First, popularity is a multilevel phenomenon. That is, preferential attachment did not influence the actor by actor network, but did influence several multilevel parameters, suggesting complex interdependencies between actors and events. Second, closure was surprisingly not evident in the network, suggesting a lack of clustering/transitivity in the network. Theoretical, methodological, and practical implications are drawn from the results

Collective Actions and Social Movements WED.PM1

To Harness an Outbreak: Relational Bases of Mobilization

Shin-Kap Han, Seoul National University

Contact: shinkaphan@snu.ac.kr

The March First Independence Movement in 1919 — one of the most celebrated events in Korean history — was a stunning feat of mobilization by any measure. Given its central place in Korean national historiography and the archival data available, however, there exists an odd gap in the standard narrative of the event. The following passage is typical of them: “Under the harsh colonial rule of imperial Japan the nationalistic spirit of resistance had grown and spread to all segments of Korean society and had almost reached the point of explosion.” The movement is, hence, seen as an inevitable outbreak of this nationalistic spirit of resistance. Such a view, focused on the latent disposition of the people, may provide a partial explanation of the scale and scope the movement has eventually taken. As in any effort at extensive and sustained mobilization, however, it required far more than aggrieved individuals. Above all, they needed to be harnessed, which, perforce, required the hard work of organizing. From the primary data of court depositions and police records, I reconstruct the ties that connected the actors and trace how these ties were linked up to form the movement network as a whole. The findings demonstrate why and how the ties and the network they formed mattered in the making of the movement.

Communication Networks WED.PM1

Communication Networks WED.PM1

Connecting Project Managers with 'The Art of War'. A network approach to strategic project management communication.

Line Berggreen Ramsing, Aarhus University, Denmark

Contact: lbra@asb.dk

Project managers are aware of the strategic network considerations and calculations they make in order to proceed with a project, solve emerging issues and to be proactive about potential issues. Machiavelli emphasized that one should have regard not only for present problems but also for the future ones. Accounts from a multiple case study in four major Danish companies reveal how calculating and communicating reality about a project to stakeholders require knowing the profession, having the integrity and the courage to take on the responsibility of dealing with the scenario and stepping into the darkness in the anticipation of the unknown. Sun Tzu emphasized the importance of positioning in military strategy. The decision to position must be based on both objective conditions in the physical environment and subjective beliefs of other, competitive actors in that environment. Strategy requires appropriate responses to changing conditions, competing plans, creating unexpected situations. Accounts demonstrate a distinct presence of well-considered informal strategic communicative behavior and action leading up to formal communicative procedures. The study is rooted in theory on embeddedness, structural holes, and weak ties are used as a lens to understand how embeddedness and network structure may affect communicative action, and understand the motivation in the relational communicative behavior underlying the project manager's actions and choice of strategy both in relation to specific projects but also the project manager's own networks beyond project related work.

Communication Networks WED.PM1

Of the structures we create: Using relational event analysis to predict group performance outcomes

Andrew Pilny, UIUC, alex yahja, Scott Poole, Melissa Dobosh

Contact: apliny2@uiuc.edu

Most experimental studies using network structures as predictors of group performance create separate conditions for different network conditions. However, given the growth of network

based organizing, there is a growing impression that networks in teams are rarely ever fixed to mirror a type of predetermined structure. Instead, networks are created and sustained through the interactions between individuals, or in other words, self-organized. While there continues to be research analyzing the antecedents of self-organized networks (e.g., ERGM), there is less work understanding the outcomes of such networks.

In the current study, we had subjects play a first-person military style video game in a multi-team system (two teams, two people each). The game required teams to accomplish a variety of tasks, several which required communication within and between teams. As such, the current project investigates the impact of self-organized network structures on group performance. Methodologically, we used relational event models (REM) to determine the structures created by multi-team systems from each experiment ($n = 30$). Next, we operationalized significant parameters from the REMs as independent variables with each multi-team system as a unit of observation. Finally, we use hierarchical linear regression to determine the effects of different communication network structures on group performance outcomes while controlling for a host of other variables.

Currently, we have completed data collection and are preparing/cleaning all levels of data. We anticipate the results of this research to be completed by January 2014 and ready for the Sunbelt conference.

Communication Networks WED.PM1

Speaking Diplomatically: Examining Agenda Setting in the US State Department Using Relational Event Modelling and Conversation Chains

Jonathan Mellon, Nuffield College University of Oxford, James Hollway

Contact: jonathan.mellon@nuffield.ox.ac.uk

Communication event datasets are increasingly common targets of inquiry, but bias can be easily introduced unless inter-dependencies are taken into account. Network analysts have long understood that communication events are not independent but conditioned by the emergent structural network of who communicates with whom. More recently, models have been proposed for dependencies among multiple recipients of communication events, such as team emails. In this paper, we identify and propose a model for a third level of dependency: conversation chains. We argue that choosing multiple recipients are not always decisions made by each actor anew, but often resemble a fine-tuning process of adding and removing recipients from a template drawn from past interactions along a chain of communications. To address this issue, we develop a new Relational Event Conversation History Actor Identified Network model (RECHAIN) that models actors' decisions to 1) choose conversation chain(s) to continue and 2) add or remove recipients from a recipient template populated by those included in past communications in that/those conversation chain(s). Thus we only model actors' decisions rather than recipients passively inherited as a by-product of communication technology and

practice. We demonstrate this model's utility using a new dataset of 400,000 diplomatic cables sent between US State Department embassies between 1973 and 1974. We show that a substantial part of the communication structure is induced by State's central bureaucracy's ability to initiate long chains of messages, affecting the ability of embassies to deliver information to a tailored recipient set.

Communication Networks WED.PM1

The Strength of Long Ties

Patrick Park, Cornell University, Michael Macy

Contact: pp286@cornell.edu

40 years of research on the strength of weak ties confirms that tie strength correlates with the extent of embeddedness and that non-embedded bridging ties tend to be weak. However, little is known how bridges of varying lengths are distributed at the population level and whether tie strength decreases as length increases. Using a communication network constructed from complete phone call records among 51M phone lines over a one-month period in the UK, this article describes the distribution of the length of bridging communication ties of a national population, explores the distribution of tie strength in relation to length, and examines competing explanations for the observed relationship between the strength and length of bridging ties. Contrary to Granovetter's argument that "no strong tie is a bridge (1973:1364)," we find that bridge lengths have a bimodal frequency distribution as well as a nonlinear average strength. We examine three explanations for the U-shaped relationship between strength and length: (a) the tendency for bridging nodes to have stronger ties with fewer neighbors, (b) the instrumental as well as social function of the telephone, (c) the difference in the decay rate of strong and weak ties. Results are consistent with the tie decay explanation, which suggests that stronger ties endure longer despite the absence of support from common third-party ties.

Communication Networks WED.PM1

The Strength of Strong Job Leads? Network Structure and Job Lead Access and Mobilization

Steve McDonald, North Carolina State University, Joonmo Son

Contact: steve_mcdonald@ncsu.edu

How does network level embeddedness influence access to and mobilization of job finding resources? Classic research on the strength of weak ties implies that networks comprised of weak connections may be best positioned to obtain job information. By contrast, more recent studies of job informants suggest the opposite. We use a nationally representative sample of

U.S. survey respondents to adjudicate between these positions. Specifically, we examine how features of occupational networks (closeness, trust, density, kinship, and homophily) are associated with the receipt of unsolicited job leads. Furthermore, we explore how these network characteristics relate to the source of that information (internal or external posting), the mobilization of that information (follow-up activities), and the outcome (being offered a job). The results from multivariate regression analyses reveal that the access to and benefits of unsolicited job leads are linked to indicators of both strong and weak network connections. In the paper, we explore the nuances of these relationships and draw out the implications for theories of information diffusion and status attainment.

Criminals, Gangs, Terrorists, and Networks WED.PM1

Criminals, Gangs, Terrorists, and Networks WED.PM1

Assessing the Impact of Error on Dark Networks

Luke Gerdes, United States Military Academy, Kathryn Coronges, Charles Thomas

Contact: luke.gerdes@gmail.com

Previous studies have examined the tolerance of random networks to varying types and amounts of data errors (Borgatti et al, 2006) and have also shown that network topologies vary in their sensitivity to data errors (Frantz et al, 2009; Everton, 2012). However, little retrospective work has been undertaken to assess the robustness of published results to issues of data error. Consequently, it is often unclear how much confidence analysts should place in theories and policies derived from existing network studies. This research examines issues of data fidelity in "real world" networks by introducing controlled levels of node-addition, node-deletion, link-addition, and link-deletion errors into published datasets. Node-level and network-level measurements are conducted and compared to results obtained from the original, unperterubed networks. The ultimate goal of the research is to demonstrate the types and scale of errors that data can contain before analytic conclusions cease to hold. Beacuse the clandestine nature of dark networks dictates that error is inherent to them, this class of networks presents an ideal test-bed to study the analytic impact of error in real-world networks. Test-cases were drawn from this important sub-class of data in order to identify acceptable error rates for specific network measures.

Criminals, Gangs, Terrorists, and Networks WED.PM1

Casting Even More Light Around Dark Corners: Inferential Methods for Illuminating Dark Networks

Phil Murphy, Monterey Institute of International Studies A Graduate School of Middlebury College, Dan Cunningham, Sean Everton

Contact: critical.node@gmail.com

Social network analysts have long recognized that the accurate analysis of network data can be seriously compromised when data are incomplete. This is of particular concern for those analyzing dark networks (Raab and Milward 2003). One potential solution to the problem of missing or incomplete network data is to infer missing information from existing structural and attribute data. In this paper, we extend previous research presented at the 2013 UKSNA and

China INSNA conferences, and evaluate two additional approaches in terms of their potential to infer missing network ties from an incomplete network dataset: (1) exponential random graph models, which allow analysts to explore the links between a network's micro and macro properties (Lusher et al., 2013), and (2) latent space models, in which the probability of a tie between two actors is a function of the distance between them in an unobserved Euclidean social space in which the actors' location arise from a mixture of distributions (Hancock et al., 2007). Our evaluations use the Noordin Top terrorist network data, a relatively large and complex dark network that we know well and have explored in depth. We use subsets of the Noordin data in order to simulate the process that a naive analyst will undergo when observing and gathering information on a dark network. We then compare the performance of the two inferential techniques imputation techniques, with particular attention to their practicality to the field analyst, who faces unique data gathering constraints and environmental challenges to timeliness and accuracy.

Criminals, Gangs, Terrorists, and Networks WED.PM1

Covert network data: a typology of effects, processes, practices and structures

Kathryn Oliver, University of Manchester, Nick Crossley, Gemma Edwards, Johan Koskinen, Martin Everett

Contact: kathryn.oliver@manchester.ac.uk

The literature on covert networks has increased rapidly over the last decade, partly in response to large-scale terrorist acts and organised crime. However, 'covertness' may also refer to other types of secret ties, nodes or activities, such as political resistance, or unusual sexual practices. Theoretical claims – sometimes conflicting – are routinely made about covert networks. These focus on the centralisation and density of the networks, the roles of pre-existing ties, the segregation of from wider populations recruitment, and functionality of the network. Moreover, the definition of 'covertness' is not always clear; the practices of what is kept secret from whom, when and why, are likely to differ widely according to context. How these practices may influence covert networks, and whether there are general rules which can be applied to covert networks, is similarly unclear. We argue that there is limited data available to test these claims, and that there is a need to develop a typology of covert networks. To investigate the effects, processes, practices and structures of covert networks, we collected data and theories on covert networks. We aim to understand the commonalities between covert networks and develop specific tools to analyse covert network structures. We present our preliminary findings and identified research gaps across four themes: (1) Available data on the effects and practices of covertness (2) Available data on covert populations (3) theories and models about covert networks and (4) dedicated methods to study covert networks.

Criminals, Gangs, Terrorists, and Networks WED.PM1

Simulating Meth Production Networks

Carl Pearson, University of Florida, Emerging Pathogens Institute, Burton Singer, David Bright

Contact: cap10@ufl.edu

We present a formal model of clandestine criminal activity -- specifically, methamphetamine trade in Australia -- and then simulate that process on empirically derived organizational networks to explore the range of reasonable parameters and how external forces perturb the process. The model simulates individuals acting in roles: skilled labor, security and logistics, wholesale and retail distribution -- fulfilling the necessary steps -- precursor procurement, mediating money-skill-product exchange, production of meth, preventing disruption of production, and sales -- in the profitable production of methamphetamine. These actors comprise mechanistic parameters -- e.g., efficiency at converting money into precursor -- and internal state -- e.g., having a certain amounts of money, precursor, product. They exchange their stock over the organization network in response to exogenous signal, leading to an overall flow state -- net production and profit rates -- for the enterprise. We report on parameter studies using this model by characterize network response to shifts in the exogenous forces. We close with consideration of extensions to the model, including addressing the missing data problem (i.e., most criminal activity goes unobserved by law enforcement), individual member variation, demographic turnover in the organization, and competing criminal organizations.

Criminals, Gangs, Terrorists, and Networks WED.PM1

The Deadliest Catch: Using Dynamic Network Analysis to Elicit the Most Lethal Terrorist Organizations in Afghanistan and Pakistan

Alexander Halman, University of Pittsburgh, Sean Cercone, Darren Hedlund, Alla Khadka

Contact: alexanderhalman@gmail.com

The aim of this study is to elicit the most lethal terrorist organizations in Afghanistan and Pakistan. Employing data provided by the Global Terrorism Database from 1993-2011, we conduct a dynamic network analysis (DNA) of one-mode and two-mode networks; these include terrorist collaboration, target, attack type, and weapon type networks. We examine the lethality of each organization by assessing its centrality, weapon and attack versatility, and ability to consistently attack the most challenging targets. Binary variables such as success and suicide are incorporated in the form of attributes. Results are presented as dynamic sociograms and the findings are used to provide recommendations for the United States Armed Forces and

relevant stakeholders. The evidence suggests that not only do terrorist organizations evolve over time, but there are also considerable differences between those in Afghanistan and those in Pakistan, prompting significant implications for counter-terrorism policy.

Geographic and Social Space WED.PM1

Geographic and Social Space WED.PM1

Inter-City Traffic Networks and Their Relationship with City Median Income

S Mendelsohn, Duke Network Analysis Center

Contact: sjm26@duke.edu

Transportation infrastructure building remains a cornerstone of modern economic development policy, but what is the relationship between traffic networks and median income? In this paper, I estimate (bootstrapped, two-stage, dyadic, log LM with Heckman correction) the influence of city characteristics (including income) on the volume of passenger traffic moving between them, and the influence (bootstrapped, equilibrium flow, SAR LM) of traffic as a conduit of income circulation. I also address some of the methodology, causality, and visualization challenges associated with examining large-scale, valued, geographically-situated, highly unequal, network data of this type.

Geographic and Social Space WED.PM1

Scientific collaboration networks in Europe at the regional level

Adam Ploszaj, Centre for European Regional and Local Studies EUROREG, University of Warsaw, Poland

Contact: aploszaj@uw.edu.pl

The role of collaboration networks is more and more stressed in the context of innovation and its spatial aspects. In this particular case, most attention is given to cities and metropolises as major networks of flows not only of people, capital or goods but also of information and knowledge. The paper discusses selected spatial aspects of collaborative networks in European science. The analysis is based on overall publication output of 28 European Union countries in peer reviewed journals, covered in Web of Science database, during the period 2000-2010. The analysis was conducted on a regional level (in total 273 'NUTS2' regions). This level seems to be the most appropriate in this case, since it adequately reflects the situation in scientific centers of Europe, i.e. in cities or agglomerations where scientific activity is concentrated. The main research question of the paper is: How scientific performance of a region is influenced by cooperation with other regions?

Geographic and Social Space WED.PM1

The Spread of Autism Diagnosis through Spatially Embedded Social Networks

Kayuet Liu, UCLA

Contact: ka@soc.ucla.edu

Existing studies cannot account for the bulk of the increase in autism prevalence over the past three decades. Rising awareness about autism has not been the focus of empirical studies, even though it has been widely acknowledged as a potentially important mechanism. We have previously demonstrated that the diffusion of knowledge about autism through spatially proximate social relations has played an important role in autism's increase. Amplified by network interactions, the diffusion of knowledge about autism may be the key driver of the temporal and spatial patterns of rising autism incidence. This paper examines the impact of diffusion of knowledge on the increasing prevalence of autism by building a large-scale, empirically calibrated simulation model of the social and interaction networks of parents of all 3 to 9 year old children from 1992 through 2010 (~57 million children). Parents' social networks were empirically calibrated using location data on focal points (e.g., schools, malls, childcare centers, and other points where parents interact). The results show that in the absence of interaction at these foci—principally malls and schools—we would not observe an autism epidemic. The model correctly predicts the location of clusters of autism and the general feature of its spatial distribution. The effects of homophily on socio-economic disparity in the likelihood and timing of receiving an autism diagnosis are explored. Sensitivity analysis on the model parameters are used to identify features in the model that are particularly relevant in generating the observed spatial and group differences.

Geographic and Social Space WED.PM1

Transnational Training Spaces. A network perspective on trainee programs of transnational companies

Nina Jung, National Autonomous University of Mexico

Contact: nina.ines.jung@gmail.com

Today, many contacts and business treaties take place in transnational spaces. This situation encourages the rise of global professions and consequently requires new strategies in the training of human resources that are about to incorporate themselves into this space, such as young professionals or trainees. The results of this research indicate that transnational companies are modifying the profile of young professionals in order to connect them to the international mobility necessary because of the current globalization process. I found that

transnational companies create different types of training spaces on a transnational level, which I will call Transnational Training Spaces (TTS). These imply that, for instance, the same training program would exist in various geographic places, i.e. in different foreign subsidiaries of the same company. What is of main interest here is not the mere existence of these spaces, but also the forms of interactions and relations between the subsidiaries in different geographic areas, which I will consider as one unit: a transnational social space. The main purpose of this research is to highlight the relational and cultural elements which characterize the training in companies as transnational. To show this phenomenon I studied the trainee programs of three transnational companies in Mexico and Germany. TTS may appear in different constellations. I propose a typology of four prototypes of TTS configurations that can occur in its pure form, but also as a combination of at least two of these configurations.

Geographic and Social Space WED.PM1

Understanding geo-social network patterns from large ego-centric networks

Caglar Koylu, University of South Carolina, Diansheng Guo, Alice Kasakoff, Hilde Bras

Contact: caglarkoylu@gmail.com

An ego-centric network is a network of an actor or an event which often includes geographic components (individual location, event location). Previous research focusing on ego-centric networks focus on a wide range of methods including the analysis of connection characteristics (e.g., tie strength, closeness, the number of interconnections between contacts) and how those characteristics evolve (e.g., change in the number of social contacts, tie strength) over time. In order to understand the interplay between geography and social ties in the formation of such networks, many attempts have been made to bridge social network analysis and spatial analysis. While most of those attempts considered geography as a background variable to interpret the results of network analysis, only little research introduced methods that can analyze spatial, temporal and relational aspects in such networks. This paper introduces a visual and computational approach to understanding the spatial, temporal and relational aspects in large ego-centric geo-social networks. We demonstrate our approach using data from historical marriage registers in the Netherlands. The set of people mentioned on a marriage certificate (bride, groom, their parents, and witnesses) is a good proxy for people's social networks in the past. The selection of a spouse and of marriage witnesses was in principle free, in the sense that it was not imposed by law or regulations. Marriage networks thus represent chosen patterns of sociability for a large proportion of the population. The results illustrate differences in social structure across regions, over periods, and across social classes and religious denominations.

Adolescent Friendship Networks WED.PM2

Adolescent Friendship Networks WED.PM2

The Relationship between Goal Structure, Motivation, and Social Networks of High School Students in Korea

Chong Min Kim, Gyeongin National University of Education

Contact: educpa@gmail.com

Track: Networks in Education Research has shown that over three decades, the most noticeable theory of motivation has been a goal structure theory (Meece, Anderman, & Anderman 2006). Additionally, studies indicate that motivation was closely related to adolescents' social relationships (Makara, 2013; Wentzel, 1998). Although there were general studies investigating the effect of goal structure on motivation and social networks in U.S. (Makara, 2013), social network measurement and analysis don't have been applied to these researches with focus on high school students in Korea. I explored another source of adolescents' social networks in Korea; that is, the effects of high school students' goal structure and motivation on the advice networks in English in Korea. My research question is this: Do high school students' goal structure and English learning motivation affect the advice networks in English in Korea? The dependent variable was the advice networks in English within school while independent variables were academic goals, academic achievement, and internal motivation in English learning of 105 male students in the 10th grade in one high school in 2013. Multilevel p2 models with MCMC estimation were applied and RSIENA models will be applied for data analysis. I found that internal motivation affected the network pattern of seeking advice and resource in English studying while academic goals were related to the network pattern of providing advice and resource for other classmates after controlling for academic achievement in English. Based on these analyses discussion and conclusion will be provided for the effect of goal structure and motivation on social networks.

Adolescent Friendship Networks WED.PM2

Cohesion in Perceived Friend Groups and Adolescents' Involvement in Risk Behaviors

Kim Pattiselanno, <p>University of Groningen</p>

Contact: k.l.pattiselanno@rug.nl

Spending time with risk-behaving peers is one of the strongest predictors of adolescents' own risk behavior (Agnew, 1991; Akers, 2009; Veenstra et al., 2013). Particularly friends influence

each other in their behavior. However, it is rather unknown under which conditions this happens. One potentially important condition is structural cohesion within friendship groups. Cohesion can arise because individuals tend to strive for transitivity in their relationships (Brewer, 2009). It can strengthen transmission of similar norms and expectations about behavior (Burk, 2005). This study examines whether embeddedness in cohesive friend groups makes involvement in risk behaviors (delinquency; substance-use) more or less likely, and to what extent peer influence processes depend on cohesion, expecting influence to be stronger in cohesive rather than loose-knit friend groups. We test our hypotheses in a longitudinal sample of 344 adolescents in secondary education (Mage = 12.91) using longitudinal social network modeling (SIENA) (Snijders et al., 2010). Peer networks were derived from unlimited friendship nominations across grades. Self-reports were used to assess delinquency and substance-use (smoking; drinking alcohol; using (soft)drugs). For both measures items were categorized into no (0) and yes (1) and subsequently summed, resulting in measures indicating involvement in delinquency and substance-use. Friend groups were defined as the reference group of friends one nominated. Cohesion was calculated as the clustering coefficient (friend group's local density) indicating the degree to which individuals nominated each other as friends, ranging from zero (loose-knit) to one (cohesive friend groups). Inclusion of this measure in the SIENA model allows for testing whether cohesion makes involvement in risk behaviors more or less likely, and strengthens peer influence effects.

Adolescent Friendship Networks WED.PM2

Examining Bridging Patterns through the Lens of Resource Control Theory: A Network Analysis of Classroom Peer Networks

Mariah Kornbluh, Michigan State University

Contact: kornblu4@msu.edu

Selective bridging (i.e. filling structural holes) can be an advantageous position within a network (Portes 1988), providing access to diverse social activities, varied information, and control over resources (i.e. the ability to manipulate information shared between groups) (Burt, 2005). However, bridging roles can have negative outcomes. For example, Henry and Kobus (2007) found that adolescents in liaison roles were more likely to use alcohol and tobacco than their peers. Although primarily studied in adult populations (Burt, 2000), there is evidence that children fill bridging positions within their classroom peer networks (Shrum & Cheek, 1987). Because of the significance of bridging, developmental researchers are interested in examining potential predictors for children exhibiting bridging relations. Resource control theory asserts that students strategically alternate between prosocial and aggressive behaviors to increase their social standing (Hawley, 1999). The aim of the current study is to apply resource control theory to assess associations between children's positions of bridging in classroom networks. Using peer nomination data, this study will explore bridging positions in third through eighth grade

students (n= 144) across five classrooms in a diverse urban school district. This study will address two primary research questions: Do students who rate high in both aggression and prosocial behavior exhibit bridging positions? Do students who rate high solely in aggressive or prosocial behavior exhibit bridging positions? Results will be used to explore if resource control theory informs the examination of bridging positions in classroom peer networks. Additionally, results may help inform school-based interventions to reduce aggressive behaviors.

Adolescent Friendship Networks WED.PM2

Networks and Opportunity: Exploring Networked Resources Among Low-Income, Minority Youth

Brooke Foucault Welles, Northeastern University, Corey Murphy, Andrea Grimes Parker, Jessica Speed

Contact: b.welles@neu.edu

Social networks enable positive outcomes for young people, including academic and professional success, social and emotional wellbeing, and improved physical health. However, being able to extract value and realize the benefits enabled by social networks requires youth to be able to identify and access the right resources at the right time. Literature suggests this is a difficult task, and disadvantaged individuals may have an especially hard time recalling and mobilizing resources in their social networks. In this paper, we will present preliminary results from interviews with low-income, minority youth in the Boston area. The interviews were structured around an “Imaginary Board of Directors” exercise and designed to explore how network recall and self-efficacy influence young people’s abilities to access social capital within their networks. In the interviews, youth were asked to brainstorm lists of social contacts (“Imaginary Board Members”) who could assist them with specific personal goals. Results indicate that, although low-income, minority youth have large and diverse social networks, limited efficacy and social norms may prevent them from identifying and accessing social capital within those networks. Although the young people we spoke with easily imagined large and diverse networks of possible “Imaginary Board Members,” when asked to identify specific individuals who could help with goals, they limited themselves to a very small number of strong ties. We will discuss the implications of these results for social capital theory and identify opportunities for network interventions among low-income, minority youth.

Business Networks WED.PM2

Business Networks WED.PM2

Analyzing Transportation Networks Connecting Continents

Chris Arney, United States Military Academy, Kathryn Coronges, Luke Gerdes

Contact: David.arney@usma.edu

On land, we study the revitalization of a long dormant Asia-Europe-Africa connection. In order to supply its troops in Afghanistan, the US military forged its way through central Asia to reopen the old Marco Polo silk roads through a series of trade routes now called the Northern Distribution Network (NDN). Our analysis determines the effectiveness of various paths for trade and influence given the political and economic topology and human and physical geography of the region. Modeling the various elements of the network, we calculate measures to understand the different forces influencing the future of the NDN. At sea, we study the effects of substantial increases in link weights as canals and port channels are getting deeper and wider and transcontinental transport companies are getting larger and fewer. Simultaneously, global warming is providing a new and potentially dominating Arctic route in the network. Our network measurements seek to guide policy for producing better network flow while maintaining competition in the world's busiest trade routes without eliminating smaller companies and smaller ports.

Business Networks WED.PM2

Corporate Governance and Nested Authority: The Effects of Selection and Influence on the Balance of Power in American Corporations

Richard Benton, North Carolina State University

Contact: rabenton@ncsu.edu

Corporate governance refers to the institutions and structures that allocate power among participants within a publicly traded corporation—most notably dispersed shareholders/owners, concentrated managers, and boards of directors. Board interlocks, when a common director sits on the board of two or more firms, influence corporate governance practices by spreading information and status, among firms. Recent research documents how firms learn about corporate governance practices through their interlock ties to other firms. Firms also recruit directors based on previous experience serving firms with established governance orientations and these appointments serve to reinforce power dynamics within

corporations. While previous research has investigated these mechanisms in isolation, this study investigates how these processes are intertwined as 1) governance practices diffuse across interlocks and 2) firms select board members based on their experiences in similarly governed firms. These alternative, but co-occurring, processes offer avenues for firms to change or reinforce existing governance orientations. The study uses Stochastic Actor Oriented Modeling, a recently developed technique in social network analysis, to examine the coevolution of practice diffusion and director selection in the network of board interlocks among the largest publicly traded US corporations. By addressing the co-occurrence of practice diffusion and director selection this study will show how corporate governance is embedded in the web of director interlocks.

Business Networks WED.PM2

Knowledge about customer and its implication in company revenue

GABRIEL PEREZ GUZMAN, Universidad Anáhuac México Sur

Contact: uvlnatural@yahoo.com.mx

It aims to increase the profits of the companies and a shopping experience for the customer through the construction of a system based on knowledge about customer. Based on a review of the literature which evaluates the manner in which the client identifies their needs and the way in which organizations seek to meet these needs, proposed can that several of the factors that determine the identification of needs be characterized through social network analysis managing to achieve a better understanding of consumer purchase behavior, this makes it possible to build a model that simulates in the first instance, and then transform into an application, which enables businesses to infer the individual behavior of the customer. Work includes the design a database, a name generator, applications for generating inferences and the procedure of computation that manage all this information are constructed .

Business Networks WED.PM2

SNA and HER: More than a Marriage of Convenience

John McCreery, The Word Works, Ltd.

Contact: jlmc@wordworks.jp

SNA (social network analysis) and HER (historical and ethnographic research) are made for each other. SNA. Looks to HER for explanations of details of empirical network structure revealed but not explained by network analysis algorithms. HER looks to SNA to reveal details that escape the unaided human eye and to provide a solid skeleton that historical and

ethnographic narrative can bring to life. This paper illustrates these propositions by describing a project that combines network analysis of credits data from the annual that chronicles the results of one of the Japanese advertising industry's largest advertising contests at five year intervals from 1981 to 2006, with documents published by an active trade press and interviews with key figures identified by the network analysis. During the period in question, TV commercials captured the lion's share of advertising spend while the share of print media declined and the oligopoly dominated by Japan's two largest advertising agencies solidified. The period as a whole was split between the rise and collapse of the economic bubble of the late 1980s. This presentation will examine how these historic events affected network structures and the careers of the industry's most prominent creative stars.

Cognitive Social Structures WED.PM2

Cognitive Social Structures WED.PM2

A Novel Formalization of Peer Influence Incorporating Both Self- and Alter-Directed Sentiment and Disposition

Kirk Dombrowski, Department of Sociology University of Nebraska-Lincoln

Contact: kdombrowski2@unl.edu

Peer influence has received considerable attention from social network analysis, and more broadly. The availability of topologies that go beyond ego networks has opened considerable debate about commutative effects, while time series network data has allowed for the separation of assortative effects from behavior change. Missing from most accounts, however, is information about—and means for incorporating into network models—peoples' dispositions towards their own behaviors, as well as the behaviors of their peers. Someone can be both indifferent to their own smoking behavior while disapproving of the same behaviors in their close associates, and vice versa. This paper explores a method for formalizing network data that includes both disposition towards ego's own behavior, and his/her disposition toward the same behaviors in those around him/her. The ability to incorporate such data into models that normally deal only with similarity or difference of behavioral state moves our models a step closer to what intuition tells us to be an important aspect of peer influence—how those around us “feel” about our habits, behaviors, or personal states. The paper describes the formalization process and applies it to social network data on alcohol co-use in a northern indigenous community in North America.

Cognitive Social Structures WED.PM2

Seeing Networks Clearly: The Influence of Holistic-Analytical Thinking Styles on Network Perception and Coalition Selection

Xiumei Zhu, Purdue University, Benjamin Russell

Contact: zhu74@purdue.edu

Accurate perception of network relationships is an important determinant of critical organizational processes and outcomes such as leadership and decision-making. In the present study, we advance research on network perception by investigating the role of holistic-analytical thinking styles in influencing network perception and decision-making on coalition selection. We focused on two dimensions of holistic-analytical thinking style, namely, attention

to field (as opposed to parts) and interactionist (as opposed to dispositionist) causal theory. Results from 281 participants revealed that holistic thinking, compared with analytical thinking, had both advantages and disadvantages for network perception. While individuals with greater attention to field reported more accurate network perception, individuals inclined toward interactionism in causal theory were less accurate. Further, when linked to organizational decision-making, attention to field enhanced the effectiveness of coalition selection, in part through the mediation of accuracy in network perception; while interactionism, via the full mediation of network perception, indirectly led to less effective coalition choice. We discuss theoretical and practical implications, and suggest further research on the implication of holistic-analytical thinking styles for network perception and organizational processes and outcomes.

Cognitive Social Structures WED.PM2

The Microstructures of Network Recall: How Social Networks are Encoded and Represented in Human Memory

Matthew Brashears, Cornell University, Eric Quintane

Contact: meb299@cornell.edu

How do individuals store and recall social networks in memory? Research has linked social network size to the neocortex and a growing number of studies indicate that aspects of psychology and cognition influence network structure. Nevertheless, we remain ignorant of one of the most fundamental links between social networks and cognition: how network information is stored and retrieved from memory. Are networks recalled as individual dyads, as triads, or as larger groups? This paper employs an innovative experimental design using human subjects coupled with sophisticated exponential random graph models to explore how social networks are stored in memory. The results indicate that humans principally encode network structures as triads, thereby permitting individuals to track both group membership and in-group cleavages with cognitive economy. The results further support prior research showing that networks are simplified for storage using “compression heuristics,” and that characteristic errors result from this process.

Cognitive Social Structures WED.PM2

Sex, Stereotype Threat and Network Recall

Emily Hoagland, Cornell University, PhD student in Sociology, Matthew Brashears

Contact: emh54@cornell.edu

How do individuals' gender, and gender identities, influence their ability to encode and recall social relations? Social networks have long been known to differ by sex and an increasing body of research indicates that cognition is essential to the formation and maintenance of networks. Similarly, the research on stereotype threat shows that activating gender identities can degrade cognitive performance in some situations, even against individual wishes. It therefore seems likely that males and females, particularly when made aware of their gender, may exhibit different strategies for encoding and recalling social information in memory. We examine this possibility using a laboratory experiment that asks respondents to memorize and recall a novel social network after receiving either a gender prime or a control prime. The results indicate that while gender impacts social network recall, being made aware of one's gender identity does not. This indicates that differences in male and female networks may be partly due to fundamental, sex-based differences in network cognition.

Collaboration and Coordination WED.PM2

Collaboration and Coordination WED.PM2

An ace in the hole: Effects of positional network accuracy

Annefleur Krijkamp, Inter-organizational network analysis

Contact: annefleurkrijkamp@gmail.com

A large body of research has examined performance effects of inter-organizational collaboration within networks. While these studies enhanced our understanding of the antecedents and consequences of inter-organizational collaboration, they all built on the assumption of a fully accurate perception of organizations' network positions. In this study, we allow for variation in positional network accuracy and propose that performance effects are strengthened by increasing accurate organizational perceptions of network positions. More specifically, previous research has considered the, mainly positive, performance effects of structural holes positions (i.e., positional accuracy) for organizations. In this study, we systematically investigate the performance effects of varying positional accuracy levels. For this research we gathered data in two whole networks in the health care industry in the Netherlands. Initial results show that there appears to be a positive relation between organizational performance and the extent to which organizations are accurate about their structural hole position. Additionally, performance differences are found between organizations that think they are occupying a structural hole (whether or not accurately perceived) and those actually bridging a structural hole. In short, in this study we develop a better understanding of the performance effects of relaxing an important assumption in network theory.

Collaboration and Coordination WED.PM2

An Evaluation of Collaborative Research in a College of Engineering: A Social Network Approach

Oguz Cimenler, University of South Florida, Kingsley Reeves, John Skvoretz

Contact: ocimenle@mail.usf.edu

A frequently used output to measure scientific (or research) collaboration is co-authorship in scholarly publications. Less frequently used are joint grant proposals and patents. Many scholars believe that co-authorship as the sole measure of research collaboration is insufficient because collaboration between researchers might not result in co-authorship. Collaborations involve informal communication (i.e., conversational exchange) between researchers. Using

self-reports from 100 tenured-track faculty in the College of Engineering at the University of South Florida, researchers' networks are constructed from their communication relations and collaborative output relations (e.g., co-authored or joint publications, joint grant proposals, and joint patents). The data collection: 1) provides a rich data set of both researchers' completed and in-progress collaborative outputs, 2) yields a rating from the researchers on the importance of a tie to them 3) obtains multiple types of ties between researchers allowing for the comparison of their multiple networks. Analysis shows that the small-world property occurs only in the network of communication. QAP regression results show that communication highly, barely, and negatively impacts joint grant proposals, publications, and patents, respectively. Furthermore, ERGM results indicate that spatial proximity and gender have no effect on joint grant proposals and publications, respectively.

Collaboration and Coordination WED.PM2

Collaboration and Creativity: Effects of Tie Strength

Jian Wang, ECOOM & MSI, KU Leuven

Contact: jianwang08@gmail.com

This paper studies the relationship between egocentric collaboration networks and creativity at the individual level. Collaboration networks are viewed as organizations of science production, and characteristics of the collaboration network affect creativity at the individual level across all his collaborative teams. For egocentric networks we focus on the characteristics of tie strength and tie configuration, and the creativity is indicated by the number of citations. Survey and bibliometric data about 606 American scientists in five disciplines are analyzed. There is an inverted U-shaped relationship between network average tie strength and creativity, because an increase in tie strength on the one hand facilitates the creative process and on the other hand decreases cognitive diversity. When the network average tie strength is strong, a more skewed network performs better because it still has a "healthy" mixture of strong and weak ties. Furthermore, the tie strength skewness moderates the effect of network average tie strength: both the initial positive effect and the later negative effect of an increase in tie strength are smaller in a more skewed network than in a less skewed one. This paper makes two theoretical contributions. First, it proposes a network lens for the organization theory of science, in which dynamic collaboration networks are viewed as the venue for knowledge creation. Second, it explores tie configuration within collaboration networks and contributes to the development of a network theory beyond a simple dichotomy between strong and weak ties.

Collaboration and Coordination WED.PM2

Rivalry and collaboration in the open-source arena: The WebKit case

Jose Teixeira, University of Turku, Lin Tinting

Contact: jose.teixeira@utu.fi

In an era of software crisis, the move of firms towards distributed software development teams is being challenged by emerging collaboration issues. On this matter, the open-source phenomenon may shed some light, as successful cases on distributed collaboration in the open-source community have been recurrently reported. In this paper, we explore the collaboration networks in the WebKit open-source project, by mining WebKit's source-code version-control-system data with Social Network Analysis (SNA). Simple network visualizations and clustering allows us to observe how key events in the mobile-device industry have affected the WebKit collaboration network over time. With our findings, we show: the explanation power from network visualizations capturing collaboration dynamics; and the usefulness of network clustering for detecting sub-communities rivalry dynamics; with a high-networked software project over time. We also reveal the WebKit project as a valuable research site manifesting the novel notion of open-coopetition, where rival firms collaborate with competitors by open-source manners.

Exponential Random Graphs WED.PM2

Exponential Random Graphs WED.PM2

Adjusting Reciprocity and Triadic Effects in ERGMs for Network Size

Pavel Krivitsky, University of Wollongong School of Mathematics and Applied Statistics, Eric Kolaczyk

Contact: pavel@uow.edu.au

An Exponential-family Random Graph Model (ERGM) formulated to model network features such as mean degree, reciprocity, and friend-of-a-friend effects is formulated for a network of a particular size and composition, and its results cannot, in general, be applied to a network of a different size to produce similar structure. Krivitsky, Handcock, and Morris (2011) used an offset technique that allowed an ERGM with a fixed parameter configuration to produce stable mean degrees across a variety of network sizes. At the same time, there has been a significant interest in deriving asymptotic properties of ERGMs and ERGM parameter estimates as the network grows bigger. We show that assumptions about what it means for a network feature to be similar across different network sizes has a strong effect on asymptotic properties of ERGM estimates. Using the heuristic that a network feature is similar for networks of different sizes if each individual actor's "view" of that feature stays (on average) unchanged, we extend the offset technique to produce ERGMs that, for a fixed parameter configuration, produce networks that have stable reciprocity and triadic closure bias. We report theoretical results for the former and simulation results for the latter, suggesting network-size invariant parametrizations for ERGMs modeling these effects.

Exponential Random Graphs WED.PM2

Explaining and Resolving Degeneracy in Exponential Random Graph Model Estimation

Mohammadreza Samadi, University at Buffalo, Alexander Nikolaev

Contact: msamadi@buffalo.edu

This paper begins by reviewing the challenges in Exponential Random Graph Model (ERGM) estimation, known as degeneracy. Presenting ERGM formulation from the entropy maximization perspective, the roots of two degeneracy issues are explained: one issue discovered by Snijders et al. (2006) and the other by Chatterji and Diaconis (2013). The paper then offers a resolution to the former issue by presenting a Markov Chain Monte Carlo (MCMC) driven ERGM estimation algorithm that works on the space of graph statistic counts (counts of

edges, k-triangles, k-stars, etc.) In order to specify an ERGM model in such space, one needs to evaluate the number of ways in which a graph with any given counts of statistics can be formed. This task is performed using long-standing results from random graph theory. It then leads to an intuitive MCMC procedure, which for illustrative purposes is compared against conventional MCMC procedure. Then, in the same graph statistic count space, Levenberg-Marquardt gradient descent is executed, maximizing the log-likelihood and updating the parameter values of a given ERGM. Computational experiments with the presented algorithm are reported, returning encouraging results in terms of estimation accuracy and time. Finally, the scalability of the method to very large graphs is explored.

Exponential Random Graphs WED.PM2

Network Formation-based Exponential Random Graph Modeling

Siddhartha Nambiar, University at Buffalo, Alexander Nikolaev

Contact: s34@buffalo.edu

This paper begins to bridge the gap between Exponential Random Graph modeling (ERGM) and Network Formation Dynamics modeling. Given a formed community of individuals (by assumption exhibiting stochastically identical behavior), the presented model seeks to explicitly quantify individuals' preferences for befriending strangers versus friends-of-friends, e.g., providing a detailed treatment of k-triangle network effects. In doing so, it accounts for all possible ways in which the observed community may have formed. As a result, individual behavior principles become more evident from observations of communities of different sizes, allowing for behavior comparisons across multiple networks. Thus, the presented model overcomes the recently discovered fundamental challenge of conventional ERGMs - the lack of consistency under sampling, - which the presented paper reviews and explains with an example. An implemented parameter estimation algorithm for the presented model performs MCMC-driven likelihood maximization. The estimated model parameters allow for intuitive interpretation. Computational results with the presented model are provided, and the obtained insights are discussed.

Friendship networks WED.PM2

Friendship networks WED.PM2

Friendship Networks and Trajectories of Early Adolescent Marijuana and Alcohol Use

Michael Pollard, RAND Corporation, Harold Green, Jr., Kayla de la Haye, Joan Tucker, Matthew Hoover, Dorothy Espelage

Contact: mpollard@rand.org

This paper examines indegree, outdegree, and peer substance use as predictors of developmental trajectories of marijuana and alcohol use among adolescents. We use longitudinal data from The University of Illinois Bullying and Sexual Violence Study from 2008-2010, tracking students from grade five through grade eight in three public schools in Illinois. We identify a set of four developmental trajectories of marijuana use (never, experimenter, low increase, high increase) and five trajectories of alcohol use (never, experimenter, steady-low, steady-mid, increaser) using latent class growth analysis. Preliminary results from multinomial logistic models predicting trajectory membership indicate that for marijuana use, peer network marijuana use did not predict trajectory membership, although indegree did predict belonging to the experimenter trajectory (versus nonuse), as did peer drinking. In contrast, for alcohol use, outdegree predicted membership in the experimenter trajectory (versus nonuse), and alcohol use predicted membership in both the experimenter and steady mid use trajectories (controlling for peer marijuana use). These preliminary results demonstrate that peer drinking behavior predicts membership in certain marijuana and alcohol use trajectories, but not all of them. Furthermore, experimental use trajectories of each substance are related to indegree and outdegree in different ways, suggesting current popularity (indegree) may be relevant to marijuana experimentation, while alcohol experimentation is tied to popularity-seeking (outdegree). We discuss these models in greater detail, including whether school, family, and neighborhood factors may mediate these associations.

Friendship networks WED.PM2

Is Britain Pulling Apart? Homophily and Homogamy in contemporary UK

Dave Griffiths, University of Stirling, Paul Lambert

Contact: david.griffiths@stir.ac.uk

This paper explores dominant and subordinate processes of homophily in contemporary Britain. Data has been harnessed from large-scale social surveys to explore homophily patterns

across 10 dimensions (including politics, religion, ethnicity, newspapers, sports and occupations). By pairing these dimensions we have analysed which types of homophily appear to hold dominant, and subordinate, positions in the social interaction structure. Data is compared between time-points and by age to understanding the changing dynamics of kinship in the UK and show that our social networks are increasingly becoming more diverse.

Friendship networks WED.PM2

Large Numbers of Friends of Friends of Friends: As A Consequence of Structure

Scott Feld, Department of Sociology Purdue University

Contact: sfeld@purdue.edu

People's friends inevitably have more friends than they do on average, but what about their friends? We show that, in the absence of further structure, those friends of friends have the same average number of friends as the friends do. However, research suggests that social networks are generally structured such that people with more friends tend to associate with others with more friends, a property called assortativity. We show that the amount of assortativity determines the extent to which friends of friends have more friends than the friends do. Thus, we suggest that it should be common to find that friends of friends have more friends than the friends do, who have more friends than people overall. Implications are illustrated for variations on a small hypothetical network, and for the Facebook friends of a convenience sample of 102 college students. Furthermore, assortativity implies that the mean number of friends continues to increase at increasing distances to asymptotically approach the largest eigenvalue of the network matrix. Thus, *ceteris paribus*, people tend to reach increasingly central others at further removes, and the rate of spread through a network accelerates with distance.

Friendship networks WED.PM2

Social network interconnections among the confidants of older adults: Findings from a longitudinal, nationally representative study

James Iveniuk, University of Chicago

Contact: iveniukj@gmail.com

For older adults, interconnections among alters can have implications for overall health and well being. However, little is known about why some alters are highly interconnected within older adults' networks, while other alters are not. I use the National Social Life Health and Aging Study (N=3005), a national probability sample of older adults, to examine the

interconnectedness of older adults' alters, as well as changes in interconnectedness of alters over five years. Older adults' primary family members (spouse and children) were the most densely interconnected members of their networks, but primary family members had the lowest range of contacts, meaning they were mostly tied to other primary family. Increases in ego-alter tie strength were also associated with particular confidants becoming more interconnected with other confidants. Furthermore, increases in older adults' network size were associated with a decrease in alter interconnectedness. This research indicates that when older adults' networks are highly interconnected, this interconnectedness is often concentrated among persons who share a particular role-relationship with the older adult. Also, changes in the interconnectedness of confidants seems to depend largely on characteristics of the network rather than characteristics of confidants or older adults themselves.

Gender and Social Networks WED.PM2

Gender and Social Networks WED.PM2

Female-centered kin networks and mobile phone communication

Devon Brewer, Interdisciplinary Scientific Research, Drew Margolin, David Lazer

Contact: dbrewer@interscientific.net

Over the last 50 years, North American respondents in a few demographically narrow samples reported communicating more with female kin than male kin. We examine whether kin networks are female-centered in 3 studies. We conducted 2 surveys of nationally representative samples of adults in the USA and Spain (n=1,000 each) in February, 2013. The surveys focused on mobile phone communication. We also carried out a study of mobile phone communication in the hours after the Boston Marathon bombings (April 15, 2013). Participants (n=149) in this study downloaded an app that administered a survey about the calls and texts logged in the 9 hours after the bombings. Each survey included questions about whether a respondent's mother and father were alive, and the number of brothers, sisters, and children a respondent had. We will compute the proportion of respondents who had a particular kin role among the three most frequent reported call contacts (national surveys), three most frequent reported text contacts (national surveys), and in the 9 hours after the Boston bombings (app study), conditional on the presence of that kin role for the respondent. We will also investigate communication patterns within specific dyads (mother-son, mother-daughter, father-son, father-daughter, brother-sister, brother-brother, sister-sister).

Gender and Social Networks WED.PM2

Perceptions of Same-Sex, Opposite-Sex, and Cross-Sex Classroom Relationships in Middle Childhood: Gender, Grade, and Transitivity Effects

Jennifer Neal, Department of Psychology, Michigan State University, Zachary Neal, Elise Cappella

Contact: jneal@msu.edu

This study employs cognitive social structures to explore the role of gender, grade, and transitivity in predicting the accurate perception of same-sex, opposite-sex, and cross-sex classroom "hanging out" relationships in a sample of 426 African American second through fourth grade students. Here, the unit of analysis is triadic (i.e., perceiver k by relationship between classmates i and j) yielding 19908 observations. Perceiver k's report of a hanging out

relationship between classmates *i* and *j* was counted as accurate if classmate *i* and classmate *j* reciprocally self reported a hanging out relationship with each other. We find that girls are 1.13 time more likely to have accurate perceptions than boys, and that older children are 1.63 more likely to have accurate perceptions than younger children. When *k* has a relationship with *i* and/or *j*, their perception of *i* and *j*'s relationship is more accurate. Finally, and counterintuitively, children are 1.68 time more likely to accurately perceive relationships between opposite-sex classmates (e.g. a girl reporting on a boy-boy dyad) than between same-sex classmates (e.g. a girl reporting on a girl-girl dyad). Perceivers may be more circumspect in their reports of opposite-sex relationships, only indicating the presence of an opposite sex relationship when they have some credible information that classmates *i* and *j* hang out. These findings have both substantive implications for understanding children's perceptions of social networks and methodological implications for using peer report measures of network data.

Gender and Social Networks WED.PM2

Gendering of firms' collaboration networks and innovation: The impact of national-level gender composition among firm owners

Kent Jensen, Institute for Entrepreneurship and Relationship Management, University of Southern Denmark

Contact: kwj@sam.sdu.dk

Innovation in a firm is embedded in a network around the firm, typically, and its networking benefits its innovation, as shown in earlier studies. This embeddedness is gendered, we hypothesize, in the way the women's firms tend to network less than men's firms, also when controlling for other things. This micro-level dynamic is further embedded in society, and thus differs among countries, notably, the gender composition among firm owners within a country affects the innovation from women-owned firms, we hypothesize. This impact occurs both as a direct effect and indirectly as gender composition affect the innovation benefits from networking for women-owned firms. The hypotheses are tested using data on owner/managers in 24,977 established firms in 68 countries, from the Global Entrepreneurship Monitor, analyzed by hierarchical linear modeling. Our results suggest first that gender affects networking in the way that networking is more extensive in men's firms than in women's firms (controlling for other conditions); second, gender affects innovation in the way that innovation is higher in women's firms than in men's firms (controlling for other conditions); third, gender does not moderate the benefit of networking for innovation. When further including the effect of gender composition in management circles within a country, we find that women's firms network less when management circles within a country are male dominated. We also find that male domination in management circles implies that for women's firms the effect of networking on innovation gets reduced.

Centrality in Social Networks THUR.AM1

Centrality in Social Networks THUR.AM1

Centralities are Necessarily Correlated in Core-Periphery Networks

David Schoch, Department of Computer and Information Science, University of Konstanz,
Thomas Valente, Ulrik Brandes

Contact: david.schoch@uni-konstanz.de

We offer an explanation why network analysts often find the values of different centrality indices to be correlated. Such correlations are typically generalized into stylized facts relating the centrality indices, their differing definitions and interpretations notwithstanding. We consider an alternative explanation based on the data rather than the indices, and prove that pronounced core-periphery structures necessarily yield consistent rankings across all centrality indices. Replicating and refining a study of Valente, Coronges, Lakon, and Costenbader (Connections 2008) we find that this simple insight is able to explain a substantial amount of the correlations observed in said study, and likely in others.

Centrality in Social Networks THUR.AM1

Clique Structure and Weighted Centrality Measures for Predicting Distribution Centre Location in the Supply Chain Management

AMIDU A. AKANMU, UNIVERSITY OF KENT, UNITED KINGDOM, FRANK WANG, FRED YAMOAHA

Contact: aagakanmu@gmail.com

Abstract The weights on the nodes/vertices of a graph as well as the weights on the links of such graphs play important roles in the decision for prominence or popularity of actors within any particular graph. Particularly in the supply chain management, the weights on the nodes (e.g. sales outlets) could be for instance, the value of sales in a particular store or the number of customers over a given period of time, while the weights on the link could be the driving distances between sales outlets. In this paper, we found that not only does the weighted-ness of the links and nodes affect the centrality positions of the actors, but the community structure itself and the cliques that emanates from it can be a pointer to centrality or otherwise of members of a group in the graph of the distribution system, as it is expected to affirm that the actors belonging to the high clique members are likely to have high percentage of being chosen/predicted as the most likely and appropriate distribution centre. We examined the

cliques/clusters of the weighted centrality matrix for the distributed system of a supply chain management network, and from the outcome we can predict a location of a new distribution centre in and around a particular area/region with an accuracy of more than 50%.

Centrality in Social Networks THUR.AM1

Comparing centrality measures for a given network

Peter Niemeyer, Leuphana University Lueneburg

Contact: niemeyer@uni.leuphana.de

A common way to compare centrality measures on a given network is computing Pearson's correlation coefficient. As for most networks the common centrality measures are (highly) positively correlated, this approach is not very selective. In order to get more insight into the impact of different centrality measures on a network, we introduce the notion of removal fitness, which utilizes Everett's and Borgatti's concept of induced centrality measures. Given a centrality measure and a network, the removal fitness measures to what extent the rank of a vertex (with respect to the centrality measure) is correlated to the impact, the removal of the vertex has on the ranking of the remaining vertices. Based on simulation experiments we show, that the concept of removal fitness - turns out be quite selective when applied to common centrality concepts, even if the centrality measures are highly correlated; - is quite robust with respect to common random graph mechanisms (i.e.: removal fitness applied to ,similar generated' graphs yields ,similar fitness values'; - is accessible for context based interpretation. We apply the concept of removal fitness to give suggestions for the choice of the beta-parameter in Bonacich's power measure and to critically discuss the common argument, that highly positively correlated centrality concepts are replaceable.

Centrality in Social Networks THUR.AM1

Powerful Independent Directors

Kathy Fogel, Suffolk University

Contact: kathy.fogel@gmail.com

We apply "Obedience to Authority" and the "Small World" of Stanley Milgram (1967, 1974), two of the most fundamental insights in 20th century psychology, to define powerful independent directors (PIDs) as those independent directors with high social network centrality, and thus high social influence over their peers. Cross sectional and event studies show that boards dominated by powerful independent directors carry out the duties of monitoring and advising more effectively, thus resulting in superior financial performance and

higher firm value. We argue that PIDs are more likely to overcome the tendency to express “excessive loyalty” to CEOs, particularly when the CEOs are not the Chairman of the Board.

Centrality in Social Networks THUR.AM1

Relating Centrality and Research Performance in Co-authorship Networks

Kamal Badar, Institute of Management Sciences University of Balochistan Quetta. Pakistan,
Terrill Frantz

Contact: kamal.badar1980@gmail.com

We advance the understanding of co-authorship networks by investigating the relationship between an author's centrality in an author network with his/her publishing performance. It can be argued that high network centrality causes high research performance; but it can also be argued that high research performance causes authors to be central. Preceding research studies do not provide insight into the direction of causality in this relationship. We extend the previous research into co-authorship networks by focusing on a domestic co-authorship network of researchers publishing in Chemistry and its sub-fields from a developing country (Pakistan). We test whether network centrality (degree, closeness and betweenness) causes high research performance (aggregate impact factor) and/or whether high research performance causes authors to be central. Moreover a dearth of studies on co-authorship networks in countries with lower levels of science and technology capacity can be highlighted. Most studies concentrate on productivity gains from co-authorships for researchers from scientifically-developed countries. Hence, it is not clear whether being embedded in a domestic co-authorship is as beneficial for performance outcomes for researchers in the context of scientifically-developing, lagging, and non-proficient countries. Therefore these networks in these alternate contexts may provide potentially interesting cases. The findings demonstrate the positive association of initial degree and closeness centrality on subsequent research performance, and positive association of initial research performance on subsequent, other measures of network centrality, i.e., degree, closeness and betweenness.

Collaboration and Coordination THUR.AM1

Collaboration and Coordination THUR.AM1

Network analysis in the evaluation of community-based coalitions and partnerships: A systematic literature review

Heather Clark, Texas A&M Health Science Center School of Rural Public Health, Margaret Foster, Kenneth McLeroy, Scott Robinson, James Burdine, Marcia Ory

Contact: hrclark@srph.tamhsc.edu

This presentation presents the results of a systematic literature review of 1,623 journal and dissertation abstracts that utilized network analysis techniques to study community partnerships. Study methods and analyses are presented, exhibiting commonalities and differences among the resulting papers selected for review. Background: How do we know when capacity has been built in community-based coalitions or partnerships? The development of local capacity is an appealing aspect for the use of community coalitions and partnerships because of their ability to strengthen “interorganizational relationships, providing a mechanism for individuals and organizations to participate..., better coordination of services and improved working relationships (McLeroy et al., 1993, p. 6).” But, how do you measure if relationships have changed or improved? Evaluating organizations working together toward a common goal is not a simple task, particularly since agencies often contribute different resources to the network (Provan & Milward, 2001). Coalition/partnership measures and outcomes have transitioned from measures of program attendance/performance to more comprehensive evaluations including community mobilization, relationships, and empowerment (The Aspen Institute, 1996). One approach for evaluating coalitions/partnerships is to assess the nature and extent of network relationships among members. Examining interorganizational linkages provides a way to better understand the benefits of collaboration between organizations by gaining insight into network structure and function (Butterfoss & Kegler, 2009), examining changes in frequency, reciprocity and nature of network ties. CONCLUSION: Network analysis is a viable evaluation tool in measuring the growth and expansion of community-based coalitions and partnerships.

Collaboration and Coordination THUR.AM1

Structure of scientific collaboration: considering the order of co-authors for co-authorship networks

Jinseok Kim, University of Illinois at Urbana-Champaign, Jana Diesner

Contact: jkim362@illinois.edu

The order of coauthors on a paper conveys information about the relative contribution of each individual involved. Even though coauthorship networks are a widely studied topic and the order to coauthors has strong practical relevance for evaluating scholars, this topic has received little attention from network analysts. One reason for this gap might be the lack of a framework for conceptualizing coauthor ordering effects. By symmetrizing the coauthor relations, previous studies imply the assumption that each individual contributes equally to joint paper. We address this limitation by having developed a new framework where we model coauthor networks as directed, weighted graphs and model the individual contribution of each author. This new approach enables us to leverage node-level prestige metrics that are defined for directed networks, including indegree, proximity, and beta-centrality. We report on applying our framework to co-authorship networks constructed based on the papers published in "Social Networks" between 1980 and 2010. Our results suggest that prominent scholars are likely to collaborate with other prominent scholars. We observed a small group of scholars to often lead collaborations as the first or corresponding authors, while the majority of others play a supporting role. Since these findings are not found with the classic way of modeling coauthor networks our framework supplements alternatives. We also report on the validation of our approach, where we tested compared prominent individuals identified by our method to prominence in terms of serving as conference committee members and journal editors.

Collaboration and Coordination THUR.AM1

The Impact of Collaborative Networks on University Students' Performance

Vener Garayev, Gediz University, Izmir

Contact: veneqara@yahoo.com

Networks have been reported to be effective on actors' performance in various fields they are used in. They can be formal or informal having impact on the outcomes in terms of effectiveness or efficiency. This research investigates how collaborative networks in educational environment affects students' performance in exams. Specifically, a class of freshman students in a university was involved in study, whose performance in midterm and final exams was analyzed. The study contributes to the literature on collaborative networks in educational settings.

Collaboration and Coordination THUR.AM1

The Role of Institutions in the Emergence of a Collaborative Community

Katharine Anderson, Carnegie Mellon University, Tepper School of Business, Matthew Crespi, Eleanor Sayre

Contact: andersok@andrew.cmu.edu

There has been increasing interest in how collaboration networks grow and change over time. However, most existing studies focus on changes within mature collaborative communities--relatively little attention has been paid to the earlier history of these networks, when a group of isolated individuals must somehow form a community. In this paper, we use a new data set, which focuses on collaboration within a relatively young academic field: Physics Education Research (PER). Because the field is so new, we have information about its entire history. In particular, we observe two events that are generally considered to be milestones in the development of a young academic field: the introduction of the first field-specific conference and the later introduction of the first field-specific journal. Observing these events allows us to examine the effect of these institutions on collaborative behavior and individual outcomes. We trace the growth of the field from the initial isolated researchers working more-or-less independently, through a period of growth and increased collaboration, to the present day. We show that the early introduction of a field-specific conference is associated with a substantial increase in collaborative behavior. Moreover, there is an associated shift in the pattern of collaboration between new and incumbent members of the field. Finally, we examine how differential adoption of a field-specific journal impacts the researchers who opt in or opt out of the newly-minted field.

Collaboration and Coordination THUR.AM1

Information Navigation and Hidden Profile Experiments on the Volunteer Science Web Laboratory

Brian Keegan, Northeastern University, Ceyhun Karbeyaz, Brooke Foucault Welles, Jefferson Hoye, Waleed Meleis, David Lazer

Contact: b.keegan@neu.edu

We have developed a web laboratory for running large-scale behavioral experiments called Volunteer Science. The platform allows experimenters to develop and deploy web-based behavioral experiments and recruit participants from Facebook. We describe preliminary results from two experiments that incorporate different network mechanisms. The first experiment adopts the hidden profile research design in which hybrid human-agent teams of five players

work together on a group decision making task. By manipulating the agents' preferences for reciprocity and information novelty, we examine how endogenous network effects influence the emergence of global communication network structures, and how those structures, in turn, influence human decision-making performance. The second experiment adopts an information navigation task in which participants must identify a shortest path over a complex network. Specifically, participants are given two words and connect them by selecting "adjacent" words that differ only by a single character. For example, a shortest path from "cat" to "dog" is "cat, cot, dot, dog." We show there are characteristic patterns in users' navigation and learning about the structure of a complex network. We conclude by outlining a research agenda to employ Volunteer Science to perform other large scale behavioral experiments over networks.

Collective Actions and Social Movements THUR.AM1

Collective Actions and Social Movements THUR.AM1

Building social movement infrastructure: Two-mode networks in congregation-based community organizing federations

Eric Tesdahl, <p>U.S. Centers for Disease Control and Prevention</p><p> </p>, Paul Speer

Contact: tesdahl.eric@gmail.com

Within the study of social movements, the construct of a meso-mobilization context refers to characteristics of movement communities including the organizations, meetings, and gathering places that comprise the social structure linking individuals to the broad macro-contexts in which they are embedded (McAdam, McCarthy, and Zald 1988; Staggenborg 2002). In the US, one widespread example of a meso-mobilization context can be found within the field of congregation-based community organizing (CBCO), specifically in the metropolitan-level federations of religious organizations created through this practice. Previous analysis (Tesdaahl, 2013) of collaboration within one such federation suggested that ties between member congregations exhibit an interesting variability in the tendency toward the often-observed pattern (Chaves 1999; Christerson and Emerson 2003; Emerson and Kim 2003) of racial/ethnic homophily in American religious life. Specifically, networks of inter-organizational collaboration formed around broad social issues conformed to such patterns of racial/ethnic homophily, while collaboration on local neighborhood level issue work did not. In the present analysis, we examine the extent to which this pattern is observed across a total of four CBCO federations, each in distinct US metropolitan areas. We build four discrete two-mode ERGM models and, using meta-analytic techniques, examine the conclusions that may be drawn about the structure of meso-mobilization contexts created by CBCO federations in the US in the mid-2000s.

Collective Actions and Social Movements THUR.AM1

Democratization As Relational Events: Coevolutionary Sequences and the Collapse of the USSR

Diliara Valeeva, <p>International Laboratory for Institutional Analysis of Economic Reforms</p><p>National Research University-Higher School of Economics</p>, Benjamin Lind

Contact: dilyara.valeeva@gmail.com

For over the past decade of social movement research, scholars have made great strides in emphasizing the dynamics of social mobilization. Chief among these contributions are

coevolution theories, whereby mobilization grows and declines as a stochastic process, characterized by movement actors who respond with some probability to previous events generated both by the movement as well as by other actors (Oliver and Myers 2002). While such scholarship has raised suspicions regarding aggregated data, it has curiously left disaggregated event combination sequences unexplored. For this study, we evaluate movement coevolution theories using relational event modeling (Butts 2008). This technique allows us to examine complex protest event dependency structures that generalize beyond two-party interaction models. We apply this method to national democratization movements during the collapse of the Soviet Union from 1988 to 1992. This setting proves especially ripe for these analyses given the mutually turbulent relationship between the Russian state and civil society. In addition to developing social movement coevolution theories through integrating a recent modeling technique, our study contributes to scholarship on the subjects of repression, facilitation, and democratization.

Collective Actions and Social Movements THUR.AM1

The Self-Organization of Mass Political Protests in the Absence of Media Freedom

Sandra Gonzalez-Bailon, University of Pennsylvania, Pablo Barberá

Contact: sgonzalezbailon@asc.upenn.edu

We analyze online communication activity around the protests that took place in Turkey in May and June of 2013. Given the failure of mainstream media to cover the events, online networks became particularly instrumental for the coordination of the thousands of people occupying Taksim square in Istanbul, the epicenter of the protests. We reconstruct the growth of this communication network during a 30 day observation window. We analyze changes in its global structure and fluctuations in user visibility, which provides an approximation to changes in leadership (as far as communication is concerned) and to the mechanisms behind the idea of 'organizing without organizations'. We test theoretical expectations derived from previous work in complex networks and information diffusion: that the network grows more hierarchical over time, that prominence in the network results from cumulative advantage, and that the most prominent nodes act as sinks where a great deal of the information is lost. We assess the evidence supporting (or not) these expectations and compare the observed dynamics with what has been observed in other recent instances of mass mobilizations, like the 'indignados' in Spain or the Occupy movement in the U.S. Our work sheds light into the empirical dynamics of self-organized political action, and adds a comparative dimension to the study of digital media and politics by focusing on a case characterized by lack of broadcasting independence.

Criminals, Gangs, Terrorists, and Networks THUR.AM1

Criminals, Gangs, Terrorists, and Networks THUR.AM1

A Casualty Network Analysis in Non-Major Combat Operations

Nathaniel Bastian, <p>1) The Pennsylvania State University, Department of Industrial & Manufacturing Engineering</p><p>2) Network Science Center, U.S. Military Academy at West Point</p><p>3) Center for AMEDD Strategic Studies, U.S. Army Medical Department Center & S, Yi-Shan Sung, Soundar Kumara, Lawrence Fulton

Contact: ndbastian@psu.edu

Within the military medical community, we have been trained to think of casualties as a result of traditional threats from state-on-state conflict. Although this was predominantly true through the end of the Vietnam War, for the near and mid-term, risk will remain with irregular threats posed by non-state and individual actors such as insurgent, terrorist and criminal groups for whom the traditional methods of casualty estimation have little or no applicability. The medical threats posed in non-Major Combat Operations (Non-MCO) are varied and complex. The dynamic environment that sustains irregular warfare creates a challenge to diagnose all the factors that can lead to casualties in Non-MCO. In this work, we use network analytics as a descriptive tool for understanding the nature of casualty incidents in Non-MCO. Specifically, we build a casualty network, measure its descriptive properties to understand the underlying network topology, visualize casualty network clusters, determine significant network cluster attributes, and look for relevant changes in network topology over time. Future work entails the development of a predictive model for casualty estimation using the various casualty incident factors determined from this network analysis.

Criminals, Gangs, Terrorists, and Networks THUR.AM1

From Dim to Dark: Predicting the Evolution of Criminal Clusters into Organized Criminal Gangs

Tracey Rizzuto, Louisiana State University

Contact: trizzut@lsu.edu

Research on “dark” (covert and illegal) networks suggest characteristic patterns and antecedent factors that predict network evolution and resilience. Extending these investigations, this study employs networks of Organization Resource Dependence and Network Structure theories to propose and test a model for predicting whether clusters of “street criminals” (i.e.,

“dim” networks) are likely to evolve through emergence or association into an organized criminal gang (dark network). Using a dynamic social network approach to analyzing over 11,000 criminal records from Homeland Security Information Network (HISN) archives (2010-13) for two targeted high crime metropolitan zipcodes in the United States, results confirm that cluster size, violence propensity, and Simeon ties as important factors for detecting dark network emergence, and suggest that lesser studied factors such as spatial geography and social media may be used to forecast the evolution of dim criminal cluster networks into dark organized gang networks. Implications for “smart policing” strategies that build upon local law enforcement and academic research partnerships are discussed.

Criminals, Gangs, Terrorists, and Networks THUR.AM1

Homophily, Delinquency and Co-Offending Among Neighborhood-based Youth Relations in Disadvantaged Neighborhoods

Meagan Cahill, The Urban Institute, Washington, DC, Christopher McCarty, Maria Serakos

Contact: mcahill@urban.org

Homophily has emerged as a salient factor in studies of peer relations examining behavioral outcomes such as delinquency and co-offending, particularly for adolescents. However, most studies use data based solely on friendship network ties or use network data based on official offense data, making it difficult to examine different dimensions of ties or how multiple types of relational networks (e.g., friendship, delinquent, co-offending, etc.) might or might not be associated. This paper examines the significance of various aspects of homophily across multiple network relations in a group of high risk and delinquent youth living in high crime neighborhoods. Ego network data were collected from youth living in two high crime and high poverty neighborhoods. The authors apply quadratic assignment procedure regression analyses to examine the significance of demographic aspects of homophily (e.g., race/ethnicity, nationality, age and gender) and tie strength across different types of neighborhood-based networks (delinquent, co-offending, advice, and peer network). These findings are then compared to the findings from similar analyses examining networks based outside of the neighborhood. The findings have implications for the development of neighborhood-based delinquency interventions and the relevance of culturally-appropriate and gender-specific interventions within and across neighborhoods.

Criminals, Gangs, Terrorists, and Networks THUR.AM1

Subnetwork Variation within Moderately Large Dark Networks

Sean Everton, Naval Postgraduate School, Phil Murphy, Dan LeRoy

Contact: sfeverton18@gmail.com

If analysts hope to gain a better understanding of the covert networks they are investigating, then it would be helpful to gain some assurance that relational data on subgroups of which they have gathered does not differ substantially from the larger networks from which it emerged. This leads us to wonder how much the linking patterns (e.g., micro configurations) of subgroups vary from the larger networks in which they are embedded. If they do not vary substantially, then lessons learned from observing subgroups may be of great value to those tracking and monitoring such groups. Conversely, if there is a great deal of difference, then early analyses of incoming data may be of only limited use (i.e., useful only for the next step in data collection and not informative about the overall network). The questions we ask are as follows. Do subgroups that are randomly determined (the node set that we have identified) tend to vary substantially in their linking patterns from the overall network? Similarly, self-identified subgroups within the network vary substantially in their linking behavior from the overall network? To test these questions we draw on exponential random graph models (ERGMs) to examine the overall and micro relational patterns of the Noordin Top terrorist network, which operated in Indonesia from 2003 to 2009.

Egocentric Networks THUR.AM1

Egocentric Networks THUR.AM1

The Relationship of Age to Personal Network Size, Relational Multiplexity, and Proximity to Alters in the Western United States

Emily Smith, University of California, Irvine, Christopher Marcum, Adam Boessen, Zack Almquist, John Hipp, Nicholas Nagle, Carter Butts

Contact: emilyjs@uci.edu

The negative relationship between personal network size and age is one of the most robust findings in social gerontology. In this paper, we evaluate the relationship of age and other socio-demographic variables to properties of personal networks using samples of individuals residing in the rural western United States and the city of Los Angeles. We test hypotheses that age is negatively associated with degree on six different relations and that network multiplexity is positively associated with age, and examine the relationship between age and spatial proximity to alters. For both rural and urban populations we find a non-monotone relationship between age and numbers of core discussants and emergency contacts, with rural populations also showing non-monotone relationships for social activity partners, emergency contacts, and kin. These non-monotone relations show a peak in expected degree at midlife, followed by an eventual decline. Age is positively associated with distance to non-household alters for the rural population, although residential tenure is associated with shorter ego-alter distances in both rural and urban settings. Additionally, age is negatively associated with network multiplexity for both populations. Although personal network size ultimately declines with age, we find that increases for some relations extend well into late-midlife and most elders still maintain numerous contacts across diverse relations. The evidence we present suggests that older people tap into a wider variety of different network members for different types of relations than do younger people. This is true even for populations in rural settings, for whom immediate access to potential alters is more limited.

Egocentric Networks THUR.AM1

Uncovering relational structure of position generated social networks based on the duality of positions and actors

Hiroki Takikawa, Tohoku University

Contact: takikawa@sal.tohoku.ac.jp

Aside from the number of social ties we hold, a relational structure of social ties defining associations between different types of the ties has vital importance for our social lives; for example it is related to homophily, segregation and social polarization. However, few empirical studies are conducted on a relational structure of social networks broader than that of small core networks, which is easy to investigate due to their small sizeness. Here we propose a new approach for revealing a relational structure of the broader social networks measured by the position generator. The basic idea for our approach consists in employing the duality of positions and actors. Our attempt is to uncover the associations between social positions by examining how many actors access such pair of positions at the same time. The originality lies in controlling the “quantitative” dimension of social positions related to how many other social contacts such positions bring to actors. Consequently, our approach specifies two-dimensional structure of social positions. In addition to the quantitative dimension, we uncover the “qualitative” dimension that organizes social positions according to its affinity and difference, which is closely related to homophily and segregation. We obtain a concrete network of social positions along with the qualitative dimension. Using a national representative data on the middle and elderly people’s social network in Japan, we illustrate the application of our approach to show that their social worlds are vividly divided into two different occupational position groups. *This research was supported by Grant-in-Aid for Scientific Research(S) (number 20223004) from the Japan Society for the Promotion of Science (JSPS). The permission to use the survey data is obtained from the Research Committee of Social Stratification among Middle- and Old-aged People.

Egocentric Networks THUR.AM1

The Impact of Network Composition on Successful Weight Loss in a Worksite-Based Program

Fabio Almeida, Virginia Tech, Blake Krippendorf, Paul Estabrooks

Contact: falemeida@vt.edu

Background/Objective: Social networks have been shown to be associated with weight loss and or weight status. Worksites have been suggested as ideal locations for weight loss interventions. This study examined the impact of worksite network composition on successful weight loss. Methods: Two worksites delivering in low intensity, internet-based weight loss interventions participated in the study. Weight loss program participants were the target of the current study and socio-metric surveys were given to all employees. The survey included name generator questions with additional items regarding strength and frequency of contacts among co-workers. UCINET software was used to analyze the data and calculate worksite network measures. The Index of Qualitative Variance was used to determine heterogeneity based on weight loss success and network composition. Results: A total of 98 program participants and 515 employees completed the surveys. Program participants averaged 47 years of age, and a BMI of 34, with 53% being female, and 88% Caucasian. The average social network size was

2.86, with an average of 2.58 ties per participant. Successful weight loss participants had higher density scores ($p<.05$), and more incoming ties ($p<.05$). Furthermore, they had more network members of the same sex ($p<.01$), meeting physical activity recommendations ($p<.05$), and successfully losing weight ($p<.01$). Conclusions: Even when weight loss programs just target individuals, our findings suggest more dense and similar networks are related to participant success. The findings also suggest that targeting networks may enhance existing weight loss programs.

Egocentric Networks THUR.AM1

Social Resources and Parental Well-Being: A Comparison of Japanese and German Parental Ego-Centric Networks

Marina Hennig, Johannes Gutenberg University of Mainz FB 02, Institute of Sociology

Contact: mhennig@uni-mainz.de

The presentation compares the influence of social relations on parental, subjective well-being in Japan and Germany. According to Amartya Sen's "capability approach", people's well-being depends on their opportunities for self-realization. These, in turn, are closely related to the social resources integrated into a network of social relations. In this context, the form taken by the social resources (social capital) and their importance for well-being are closely related here to culture and traditions in question and can, therefore, vary from one society to the next. Although Japan and Germany present structural similarities, Japan's historical, cultural and religious heritage differs from those of the Western post-industrial societies like Germany. Hence it is assumed that the influence of social capital on parental well-being differs due to the varying cultural and historical significance of social relations in Germany and Japan. To investigate this hypothesis, the egocentric networks of a total of 4186 mothers and fathers in both Japan and Germany were surveyed. The results of the analysis support the hypothesis as they indicate that differences exist between the two countries in relation to the function of social resources and the strength of connections, which play a crucial role in the subjective well-being of parents. Differences also exist within the countries, in particular between men and women and in relation to the influence of social resources and the strength of connection on parental well-being.

Entrepreneurial Networks THUR.AM1

Entrepreneurial Networks THUR.AM1

Developing Quantitative Ecosystems of Entrepreneurship

Daniel Evans, Network Science Center at West Point

Contact: daniel.evans@usma.edu

Sociologists, economists, and network scientists concur that the entrepreneur's network, or specifically the people and organizations they interact with, are essential to his or her ability to identify and evaluate new business opportunities, access vital resources, and succeed economically. These practitioners have consistently struggled with developing models that are measurable or quantifiable. Most research on this subject tends to focus on the entrepreneur's social network and utilizes the Name Generator approach to develop the social network model. Our innovation is not to develop each individual entrepreneur's network but to understand the entire entrepreneurial network of the community in which the entrepreneur lives and operates. In order to develop this model, we have adapted a technique used in sociology to measure social capital called the Position Generator. This technique circumvents the massive effort of mapping an individual's social network before locating the social resources in it. By approaching the entrepreneur's network through the analysis of his connections to prominent structural positions in the community or society, researchers are able to construct measures that obtain information on the strength of ties and structural holes. For example, in a developing world entrepreneurial network these roles might include a non-governmental organization, a government program, or a family member. This presentation will describe our initial data collection efforts in Sub-Saharan Africa and present our initial findings and insights. We will illustrate our proposed methodology to quantify the entrepreneurial network in such a way that the analysis provides concrete policy recommendations.

Entrepreneurial Networks THUR.AM1

How do student startups develop their social network overtime?

Martin Haring, Social network

Contact: m.haring@hva.nl

During a half year course at the university of applied sciences. Students start up their own businesses and register these at the chamber of commerce. To find out how these startups develop their network I followed 495 students during the period 2009-2011. In this period 145

businesses were started. In 2013 only 22 companies were still up and running. I interviewed the owners of these startup once a year in the period 2009-2013. Out of these interviews I distilled the ways they were developing their network. I found that successful startups who grow their businesses use other network tactics than startups that are less successful in their development. The development of the network by using strong or weak ties was also measured. Successful startups were able to generate a lot of free publicity, they were prize winners, used social media actively and build a network with a lot of different ties. This research was unique for the longitudinal approach and the fact that most of the students had the same small network in the beginning of their entrepreneurial adventure.

Entrepreneurial Networks THUR.AM1

Knowing What You Know and Knowing What You Need: Resource Mobilization in the Entrepreneurial Process

Sarah Knirsch, Humboldt-Universität zu Berlin

Contact: sknirsch@hotmail.com

Resources gained from the personal network are a crucial factor for successful business venturing. Using ego-centered social network analysis we find that mobilized resources generally don't correlate with entrepreneurial performance: The opposite is true, since resources are often mobilized from the network in order to compensate for the lack of own resources. Looking closer at our data, we find it depends on the kind of resources ego mobilizes from her network: Mobilizing specialized know-how from the network leads to lower performance, whereas having no need for these resources leads to higher performance. However, mobilizing legal or tax-related advice leads to higher performance and having no need for legal or tax-related advice to lower performance. We conclude that for entrepreneurs it is wise to focus on professional specialization and on gaining deeper knowledge related to the business model instead of concentrating on business administration. For secondary processes it is better to rely on the social network. Thus making it a pre-condition for an effective entrepreneurial social network to contain alteri that can provide legal and fiscal know-how. We also find that it is easier to mobilize resources in large, dense networks, whereas we do not find any proof for the strength of weak ties in entrepreneurial networks.

Infectious Diseases and Social Networks THUR.AM1

Infectious Diseases and Social Networks THUR.AM1

A Simulation Study on Hepatitis C Treatment Strategies in Contact Networks of People Who Inject Drugs

David Rolls, University of Melbourne, Rachel Sacks-Davis, Rebecca Jenkinson, Phillipa Pattison, Garry Robins, Margaret Hellard

Contact: drollls@unimelb.edu.au

Hepatitis C virus (HCV) chronically infects nearly 200 million people worldwide, with over 350 000 estimated deaths attributed yearly to HCV-related liver diseases. It disproportionately affects people who inject drugs (PWID). Currently there is no preventative vaccine. Current medical treatments require long treatment durations (24 - 48 weeks), have severe side-effects, and are estimated to be effective in only about 60% of cases. Upcoming antiviral treatments will improve this situation. They will be more effective, have shorter treatment durations, and have less severe side-effects. These changes will make possible large-scale treatment interventions. How these strategies should target HCV-infected PWID remains an important unanswered question. Previous models of HCV transmission have lacked empirically grounded contact models of PWID. A recent study in Melbourne, Australia using network methods collected contact network data and blood samples (for determining current HCV infection status and prior HCV exposure) of participants. Using this data we developed a data-driven contact network model of PWID using exponential random graph models (ERGMs) and a detailed individual-based transmission model for HCV. In this talk we report results from a simulation study combining these two models to investigate HCV treatment strategies. In the context of treatment, re-infection plays a large role in the effectiveness of treatment interventions. Network-based strategies that choose PWID and treat all their contacts were most effective in reducing both the incidence rates of re-infection and combined infection. A strategy targeting infected PWID with the most contacts was the least effective.

Infectious Diseases and Social Networks THUR.AM1

Capture of Student Contact Networks and implications for Respiratory Disease Transmission

Warren Pettey, University of Utah School of Medicine and VA Salt Lake City Healthcare System, Salt Lake City, UT, United States
, Damon Toth, Matthew Samore, Molly Leecaster

Contact: warren.pettey@hsc.utah.edu

Epidemiologists use mathematical models to understand and predict infectious disease transmission. Seasonal epidemics and occasional pandemics of influenza are of particular concern and especially for school-age children who have been shown to be the primary vector and generally have the highest morbidity and mortality. Driven by the sensitivity of models to assumptions about contact among students, a recent study collected high fidelity objective contact data. The Contacts among Utah's School-age Population (CUSP) project placed wireless proximity sensors on students in 13 Utah elementary, middle, and high schools to record, on 20-second intervals, when students were within 3m of each other. We report the experience of sensor deployment, data preparation, and show example network projections and measures. The network characteristics such as density and degree have been found in preliminary transmission models to be highly indicative of enhanced transmission. These values varied by school level (elementary, middle, and high), as expected, but also among schools of a single level, among class periods during the day, and even during different periods in the same classroom. There are possible explanations for the differences to be found in schedules, school layout, seating charts, and class type (math vs workshop). We present initial findings which argue that the blend of school scheduling and physical layout—which can be changed, unlike many student mixing preferences—are major drivers of disease transmission and should be attractive targets for school-based public health intervention.

Infectious Diseases and Social Networks THUR.AM1

Reliability of social networks for spread of epidemics

Mina Youssef, Network Dynamics and Simulation Science Laboratory, Virginia Bioinformatics Institute, Virginia Tech

Contact: myoussef@vbi.vt.edu

We re-introduce the reliability polynomial- Moore and Shannon in 1956- to study the reliability of social networks for the spread of epidemics. Given synthetic social networks, where every node represents an individual with attributes (age and node degree) and every link represents a contact between two individuals, we estimate the reliability of the social network to obtain certain infection size. We revisit the theoretical definition of network reliability polynomial and

we present a computational framework to estimate the reliability of large social networks. In addition, we study the reliability for the spread of epidemics based on age groups and activity locations. Age groups and locations are ranked based on their reliability in spreading the epidemics to increase the efficiency of intervention strategies.

Infectious Diseases and Social Networks THUR.AM1

The Network viral load: A novel HIV risk assessment strategy

Britt Livak, University of Chicago, John Schneider

Contact: brittsl@uchicago.edu

Recent advancements in HIV prevention (Treatment as Prevention and Pre-Exposure Prophylaxis) move us closer to the possibility of HIV elimination. Elevated HIV viral load (VL), the level of HIV in the blood, is associated with increased transmissibility of HIV. Individuals with VLs >10,000 are considered highly infectious, thus efforts have focused on rapidly linking these individuals to care to reduce their transmission potential. Recently, the National HIV/AIDS Strategy called for the calculation of community VL to assess HIV transmission potential within geographic areas. Yet, the community VL assumes individuals only engage in risk behaviors with those in their same geographic area. We propose a new, conceptually more accurate, risk metric: the network viral load. The network VL incorporates the weighted sum of network member VLs as well as the proportion of infectious alters in the network. It can be used to predict HIV acquisition potential of index nodes, triggering targeted HIV prevention response. This metric's risk prediction will be tested using data from two NIH supported network cohorts of individuals at-risk for HIV in Chicago. To date, 180 individuals have been recruited: 96% NH-Black, 93% male (99% have sex with men), mean age 23(SD 3), 47% HIV seroprevalence (34% unaware of infection), median VL 1999 (IQR 74-17850), median # sex-partners past 6 months 2(IQR 1-4). Study enrollment started June, 2013. Data on 400 linked individuals will be presented. Methodologic challenges in developing the network VL will be discussed with case examples of the potential for targeted HIV prevention efforts.

Infectious Diseases and Social Networks THUR.AM1

The Interaction of Social Networks and Child Obesity Prevention Program Effects: The Pathways Trial

Heesung Shin, University of Southern California, Thomas Valente, Nathaniel Riggs, Jimi Huh, Donna Spruijt-Metz, Chih-ping Chou, MaryAnn Pentz

Contact: heesungs@usc.edu

Social network analysis was used to examine whether peer influence from one's social networks moderates obesity prevention program effects on obesity related behaviors: healthful behaviors and unhealthful ones. Participants included 557 children residing in Southern California. The survey assessed health promoting behaviors (i.e., physical activity at school, physical activity outside of school, and fruit and vegetable intake), as well as unhealthful ones (high calorie low nutrient intake and sedentary activity), and peer exposure calculated from social network nominations as indicators of peer influence. Using ego-centric social network data, peer influence was calculated from the nominated friends for more objectivity than perceived reports on friends. Multilevel models were conducted separately on outcomes predicted by program participation, peer exposure, and program participation by peer exposure. Results indicated that peer exposure was positively associated with one's own behavior for both healthful and unhealthful behaviors. Program participation effects were moderated by peer influence, but only when unhealthful peer influence was present. Results suggest that peer influence can diminish or amplify prevention programs. Although peers have been known to be a primary social influence on children's development, peer influence has not been examined as a potential moderator of school-based obesity prevention programs. These findings are among the first to demonstrate peer influence can diminish or amplify prevention programs. Future interventions should consider peer-led components to promote healthful influence of peers on healthful and unhealthful behaviors, and programs should be mindful that their effects are moderated by social networks.

Adolescent Friendship Networks THUR.AM2

Adolescent Friendship Networks THUR.AM2

A relational measure of social status in adolescent friendship networks

Peter McMahan, University of Chicago

Contact: mcmahan@uchicago.edu

Network measures of social status are traditionally determined by comparing individuals in a population to the network structure of that population as a whole. In contrast, this paper develops a measure of social status as an unobserved ranking of pairwise status differences between the members of a network. Status is thus conceived of as a relational quality, characterized by perceived differences in prestige rather than absolute quantities. This dyadic model of status allows a rigorous statistical approach to its estimation — status structures can be compared according to their likelihood given an observed real-world network. The relational character of the measure yields nuanced structural details beyond a simple status ordering, easily producing rich partial status orderings and directed acyclic status graphs. Using friendship nomination data from the National Longitudinal Study of Adolescent Health, this paper estimates status rankings among the students in twenty school-level social networks. The findings show that students are most likely to nominate friends of a similar social prestige to their own, but that they are significantly more likely to nominate those of somewhat higher prestige than those of somewhat lower prestige. This study further suggests that prestige is closely related to students' age while it has a weaker connection to sex and race. Finally, the paper compares its measure of status to more common measures of centrality, identifying important similarities and differences. The results suggest that the social prestige rankings presented here describe an important component of stratification that is largely neglected in existing work.

Adolescent Friendship Networks THUR.AM2

Academic achievement and academic status in schools

Daniel Alexandrov, Higher School of Economics - St. Petersburg

Contact: da1581@gmail.com

Our paper is focused on advice/help networks in schools and the interplay of gender, achievement, and other individual characteristics in the formation of asymmetric ties between 'advisor' and 'advisee' in such academic subjects as mathematics and the humanities. We also

include classroom and school characteristics in the analysis. We conceptualize indegree in advice networks as 'academic status' and compare it with general sociometric popularity. We use data from a representative survey of 100 schools in Moscow region, which includes rural and urban areas, and both standard schools and gymnasiums with advanced curriculum. For our analysis we use only most complete networks with over 75% of students responding to network questions, which gave us 244 full classroom networks, and 5020 students. Name generators used: "whom do you socialize with most of all", "whom do you ask for help in math" and "you ask for help in the humanities". The data contains general self-concept, academic self-concept (for math and the humanities), academic achievement (GPA for several subjects), scales for social anxiety, depression and aggression, and the socio-demographic characteristics: parents' education, ISEI, migration history, and minority status. The method of analysis is multilevel p2 modeling. Contrary to our hypotheses we found coincidence of advice networks and general friendship patterns, homophily in advice network by GPA (low GPA students ask for help from other low GPA students) and gender homophily, which overrides the need for advice. These and other effects will be discussed in the presentation.

Adolescent Friendship Networks THUR.AM2

Does misery love company?--Exploring the selection effects of depression among adolescents in Taiwan

Jun Zhao, Department of Sociology at University of Georgia

Contact: junzhao@uga.edu

Based on traditional wisdom and several social psychological research on how emotion structure interpersonal relationship, this study investigated how one particular emotion, depression, predict adolescent's friendship network evolution. I hypothesized that if misery does love company, homophilous selection among depressed individual is likely to occur because of their similarity. On the other hand, previous study (Schaefer et al 2011) have found that friendship network homophily on depression could be attributed to ego withdrawal, instead of bidirectional selection or alter avoidance. Therefore, depressed individual are limited in their partner because of their passive strategies in terms of extending ties. Adding to this complexity, this paper explored whether local context that student embedded in differ the mechanism that cause depression homophily by taking into account both class level and school level sex compositions. Using longitudinal data collected from five public schools in Taiwan (unisex and coed school/class with a total of 424 respondents), the results revealed strong evidence of friendship selection based on sex similarity, limited support for homophily on father's education, and individual's academic performance. However, I found no support for the preferences argument. Alternatively, the results indicated that between periods, friendship is less likely to occur for students with high depression score, thus lend support for the withdrawal hypothesis. The local context has mixed effect on the pattern that needs further

exploration. The authors conclude by discussing the implication of the results for understanding the complex dynamics between network pattern and mental health consequences.

Adolescent Friendship Networks THUR.AM2

Same School, Different Classes: Socio-economic Status Homophily in Adolescent Friendship Networks

Karen Ertrachter, <p>The Pennsylvania State University
Department of Sociology & Demography</p>

Contact: kae197@psu.edu

Previous research has found that the preference for associating with those most similar to us in terms of race and gender has been particularly important for shaping the social networks of American youth. However, research on adolescent friendships tend to only control for socio-economic status without fully examining it, despite its important role in determining health, delinquency and occupational outcomes. This paper will explore how socio-economic status shapes the composition of adolescent friendship networks within schools in the National Longitudinal Study of Adolescent Health. In particular, the effect of class on centrality and clique composition will be the focus of the paper. Traditionally, education is the main form of SES examined by SNA researchers, however it's unclear which form of SES best explains adolescent friendship patterns and centrality within schools. Other questions answered will include: Are the most central actors also the privileged students in a given school or in a given clique? How does socio-economic status homophily compare to race and gender homophily in the same networks?

Business Networks THUR.AM2

Business Networks THUR.AM2

Effects of Personality on Brokerage Positions

Frank Egloff,

Business Administration (Organization and HRM)

University of Freiburg (Germany), Olaf Rank

Contact: frank.egloff@vwl.uni-freiburg.de

If companies want to be innovative and successful they have to seek knowledge from and share information with their competitors. This is accomplished by individual company members who transfer information in personal networks with members of competing companies. Furthermore the value of brokerage positions resulting in an information advantage is often discussed in the literature. However mechanisms leading to brokerage positions - for some individuals but not for others - are yet unclear. We state that the personality of the actors affects their social behavior regards sharing and receiving information and thus determines the probability of an actor to be in a brokerage position. To measure the personality of the actors we use a big-five personality questionnaire because it most broadly covers the different facets of personality. We state that research is needed in this field by examining the effects of personality on brokerage positions because it helps explaining how informational networks between individual managers evolve and it clarifies the reasons why some managers are more successful in networking for their companies than others. Survey data was taken from managers working for different companies of the plastics industry in a regional cluster in South-West Germany. We apply a class of exponential random graph models (ERGMs) because configurations indicating brokerage positions are nested within other configurations of the networks. Our results suggest that personality is an important predictor of people being able to obtain a brokerage position.

Business Networks THUR.AM2

Hybrid Business Models in the F/OSS industry: a network approach

Riccardo De Vita, Centre for Business Network Analysis & International Business and Economics Department University of Greenwich Business Faculty, Guido Conaldi

Contact: r.devita@gre.ac.uk

Recent technological and market developments have led to the creation of meta-organizations, consisting of actors (individual or firms) collaborating to achieve a common goal even in absence of an employment relationship. Free/Open Source Software (F/OSS) has been portrayed

as the form of organisation of production that such networks of users can adopt to succeed in the development of new products. Normative models describing how firms should engage with F/OSS are however still underdeveloped. Empirical evidence suggests the existence of multiple modes of interaction between private firms and F/OSS, resulting in several hybrid business models. This study employs a comparative case study approach to investigate the network properties of the interaction between firms and F/OSS communities. Communication and problem-solving networks are studied in six different projects. The six cases were selected in order to represent different business models and vary according to two main dimensions: the extent of the involvement of private firms and the licensing status of the produced software. Given the economic relevance of innovation and F/OSS, this study has the potential to generate relevant implications for different audiences. From the comparison of the six projects investigated and the identification of commonalities and differences of firm-community interaction under different business models, both theoretical and managerial implications are formulated.

Business Networks THUR.AM2

Understanding knowledge diffusion within tourism business networks

Michelle McLeod, The University of the West Indies, David Vaughan, Jonathan Edwards, Miguel Moital

Contact: michelle.mcleod@uwimona.edu.jm

This paper examines the influence of exchange relationships (Uzzi 1997) and the attributes of the network agents (Steglich, Snijders, & Pearson 2010) to explain the factors which influence diffusion processes such as homophily (Valente 2010) within a tourism knowledge network. Networks are formed as business individuals network with other business individuals who are similar to them (Degenne & Forse 1999; Rogers 2003; Skvoretz, Fararo & Agneessens 2004) and create opportunities for the diffusion of knowledge resources within the network structure. However it is not known if the structure itself or the attributes of the agents explain the diffusion processes. Using a social network perspective this paper examines knowledge sharing in relation to the knowledge flows between business individuals in different tourism and hospitality businesses within a post code defined boundary of a conurbation. The tourism business network was defined as formal business relationships with individuals working in other tourism businesses within the location for a business reason such as for example promotion and the purchasing of supplies. Identifying and measuring the reasons for knowledge diffusion possibilities are important because inter-business knowledge flows help to build up knowledge resources. These findings were derived from a quantitative study concerning knowledge sharing activities of 200 tourism and hospitality owners and managers of a major tourist destination in Southern England. Degenne, A., and Forse, M. (1999). *Introducing social networks*. London: SAGE. Rogers, E. M. (2003). *Diffusion of innovations*. 5th ed. New

York: Free Press; London: Collier Macmillan. Skvoretz, J., Fararo, T. J., and Agneessens, F. (2004). Advances in biased net theory: Definitions, derivations, and estimations. *Social Networks*, 26 (2), 113-139. Steglich, C., Snijders, T. A. & Pearson, M. (2010). Dynamic networks and behavior: Separating selection from influence. *Sociological Methodology*, 40(1), 329-393. Uzzi, B. (1997). Social structure and competition in interfirm networks: the paradox of embeddedness, *Administrative Science Quarterly*, 42(1), 35-67. Valente T. (2010). *Social networks and health: models, methods and applications*. Oxford: Oxford University Press.

Business Networks THUR.AM2

The Influence of Social Networks on Firm's Success, Survival and Growth: A Social Network Analysis investigation of SMEs in the Bahrain Construction Industry

Sulafa Badi, <p>Research Associate</p><p>The Bartlett School of Construction & Project Management Univeristy College London (UCL)</p>, Stephen Pryke, Huda Almadhoob

Contact: s.badi@ucl.ac.uk

The success, survival and growth of Small and Medium-sized Enterprises (SMEs) in a fragmented construction sector is partly related to the business owner's ability to secure critical resources through personal networks which provide information, advice, funding and brokerage (Pryke et al., 2011). The Bahrain construction industry is particularly characterised by a culture of collectivism where business activities are inextricably intertwined with social relationships. Social network analysis is used as an analytical tool to examine the resource provision ego-networks of four Bahraini SMEs owners, taking into consideration the start-up/growth business development stages and the success/failure status of the firm. Comparative social network analysis is conducted focusing on the density of ego-networks and the prominence of resource providers and associated subgroups. The findings highlighted the evolving nature of social networks over time in order to meet the business owner's critical resource requirements in the face of increasing uncertainty. At emergence, high density networks and strong ties, primarily family relations, play a critical role. These ties are characterised by high levels of trust and cohesion, are easily accessible, and path-dependent. As firms mature, strong ties are found to restrict the attainment of a wider range of complementary resources, and hence weak ties come into play. These ties are diversified arm's length and market-based relationships and incorporate less sentimental factors than strong ties. The findings also underline the role of formal institutions in bridging networks' structural holes; helping firms to capitalise on new business opportunities.

Co-Authorship and co-citation Networks THUR.AM2

Co-Authorship and co-citation Networks THUR.AM2

Analysis of a Knowledge Network: The Case of IPN-Mexico

Magali Cárdenas, INSTITUTO POLITECNICO NACIONAL, Nadima Simón, Fernando Ramírez

Contact: mcardenasipn@gmail.com

The present research is an analysis of the structure of the National Polytechnic Institute's environmental network of Mexico. Networks have acquired an important relevance as a vehicle for collaboration and knowledge generation with regard to finding solutions to environmental problems. The importance of the study lies in the analysis of the network, using graph theory to explain the network structure. The simple network parameters examined were Betweenness centrality, Clustering coefficients and Degree distributions. We collected information from the network members' scientific production in order to examine their collaboration with other researchers and analyzed their coauthorships. The coauthorships network reveals important structures that compose the scientific community social network (De La Rosa, Martinez, Gonzalez and Velasco, 2005). The software used was CYTOSCAPE 2.8.3. The results reveal that the network is in its commencement, and the parameters betweenness centrality, clustering coefficients and degree distributions are low (Freeman, 2000, & Newman, 2003) with respect to a fully connected network. The results suggest that it will be necessary to review institutional policies in terms of resource allocation to encourage collaborative work, in order to increase the parameters value of betweenness centrality, clustering coefficients and degree.

Co-Authorship and co-citation Networks THUR.AM2

Exploring co-authorship network of Chemistry researchers in Pakistan: The gender effect

Ian McCulloh, Curtin University, Kamal Badar

Contact: cusum6@gmail.com

The gender demographics of Chemistry researchers are changing in Pakistan as more women enter the field. Collaboration among these researchers is investigated using a social network of co-authorship as a proxy for collaboration. Exponential random graph models (ERGM) are used to investigate the effect of gender, number of publications, number of citations, and research performance on collaboration while controlling for structural factors such as out-degree and transitivity. Findings indicate that experienced male researchers with many publications and high levels of performance are less likely to collaborate, while female

researchers with relatively few publications are more likely to collaborate. Furthermore, researchers with low performance scores are more likely to collaborate with others. This suggests increasing levels of collaboration inclusive of women in the growing Pakistani Chemistry research community.

Co-Authorship and co-citation Networks THUR.AM2

Individual Publication Strategies and Collaboration in Authorship: Analysis of Co-authorship Network from a Large University

Michal Bojanowski, University of Warsaw

Contact: m.bojanowski@uw.edu.pl

Publications are the main medium of scientific communication. They are the primary way of documenting and communicating research results. Different scientific disciplines developed different norms regarding the utility and function of different types of publications, i.e., journal articles, books, edited volumes, or conference proceedings, etc. Choice of a particular publication types for a stream of individual publications is an element of a broader individual publication strategy. The other element of that strategy is whether these publications, and research they document, are produced in collaboration with others. Scientometric studies report a steadily growing number of co-authored research articles. Co-authorship is an indicator of social relations between scientists: collaboration, but often also authority. Scientific disciplines differ in terms of norms related to co-authorship too. We present a dynamic analysis of co-authorship between the researchers from a large university. The data span 10 years and can be considered complete: contain all relevant publications of about 20+ thousands employees of the university. We investigate dynamic patterns and disciplinary differences in publication strategies in terms of both the structure of co-authorship networks and types of publication.

Co-Authorship and co-citation Networks THUR.AM2

Mapping the Intellectual Structure of Middle Eastern Studies: An Author Co-citation Analysis

Kosar Karimi Pour, McMaster University

Contact: k.karimipour@gmail.com

Two distinct social contexts are involved in the creation of knowledge about the Middle East in the Western academia – the knowledge about the Middle East (first social setting) should be converted into knowledge which is comprehensible in another social context. Recognizing the political and economic power that has motivated Middle Eastern studies, this project seeks to investigate the intellectual linkages between Middle Eastern and non-Middle Eastern scholars

in the process of the creation and circulation of knowledge. The necessity of disrupting power relations in the field of Middle Eastern studies is addressed in the post-colonial literature, but the essential and yet unanswered question lies in observing the local factors that generate the hegemonic structure. The focus of this project is a micro-sociological investigation on the academic collaboration among Middle Eastern and non-Middle Eastern scholars in the field. The research question asks whether the field of Middle Eastern studies is clustered based on scholars' insider/outsider statuses. Assuming that the citation networks are a valid representation of the intellectual linkages, I conduct an author co-citation analysis to draw a map of the intellectual structure of the field with a focus on authors' insider/outsider statuses; the greater the number of co-citations, the stronger the cognitive relationship between two authors. I employ Exponential Random Graph Models (ERGM) to study insider/outsider homophily in the co-citation network, and Temporal Exponential Random Graph Models (TERGM) to conduct a longitudinal study of the changes in homophily over time. The software program Sci2 is used to generate the co-citation network and network, *ergm*, and *Rsiena* packages in R are used to visualize and analyze the data.

Cognitive Social Structures THUR.AM2

Cognitive Social Structures THUR.AM2

How do I fit in? The effects of cognitive schemas on tie formation and integration.

Claudius Hildebrand, Columbia Business School

Contact: childebrand15@gsb.columbia.edu

Recognizing the value of structural positions, such as structural holes, why don't more people self-select into more beneficial positions? In this research I investigate how cognitive processes facilitate tie formation. I find that individuals' cognitive schemas influence the motivation to form new ties. Individuals with dynamic, rather than fixed views about their social capabilities are more likely to enjoy and engage in building and maintaining ties with others. I find two mechanisms that explain why individuals with dynamic cognitive schemas engage more in forming ties. First, dynamic cognitive structures reduce psychological obstacles, such as shyness or anxiety, to interact with others. Second, individuals with dynamic cognitive structures express a stronger desire to act as matchmakers and connect others in their network. Last, I discuss the effects of cognitive schemas on an individuals' position in the network structure. Individuals with dynamic schemas should be more likely to have larger, more heterogeneous networks, and should be more likely to be centrally positioned. Previous research shows the association of personality traits with the propensity to form ties and the position in the larger network structure. However, personality traits represent fixed characteristics of individuals. On the contrary, cognitive schemas are dynamic knowledge structures that can change and thus offer a flexible vantage point to integrate individuals in social networks analysis. Viewing networks as more than resource-transmitting pipes (Podolny, 2001), we posit that cognitive schemas influence the inferences an individual draws about the underlying qualities of other actors and affects their actions.

Cognitive Social Structures THUR.AM2

Mental Models through Action and Communication as a Driver for Networks

alex yahja, NCSA

Contact: alex@uiuc.edu

Psychologists have evidence to support five basic dimensions of personality, which are extraversion, agreeableness, conscientiousness, neuroticism, and openness. In the study of multi-team systems, we are interested in how personalities can affect performance of multi-

team systems. Formally, we are interested in personality measures in detail, that is, in mental models. In other words, we formalize personalities as mental models.

Personality measures and mental models are important in social networks beyond network (and communication) structures and node attributes: they probe deeper into the drivers of the networks. Personalities capture both the logical and emotional aspects of human interactions. Interactions between personalities and mental models affect networks. Network phenomena that could not be explained by network models might be explained by mental models. They are also different than network drivers such as the drivers based on theories of homophily, self-interest, exchange, collective action, balance, cognition, contagion, and proximity and activity types such as exploring, exploiting, mobilizing, bonding, and swarming.

We run a first-person game to access multi-team system performance and collected demographic and character traits data, as well as the gameplay data. The game is VBS2 which allows visually and physically realistic actions and communications.

We will report the first construction of a mental model from action, communication, and survey data. The survey data contains questions on extroversion/introversion and risk seeking/avoidance. The action data consists of the VBS2 video recordings of multi-team systems gameplays taken using FRAPS software. The communication data includes VBS2 audio recordings and CNR logs. The mental model is implemented as activity (and communication) graph with some nodes and parameters denoting contexts.

Cognitive Social Structures THUR.AM2

Visualizing collective intelligence in a problem-solving network.

Christopher Horsethief, Union Institute & University

Contact: christopherhorsethief@gmail.com

This paper details the emergence of complex network behavior, including the formation of social network clusters and small world architectures. The research setting is a language revitalization workshop, where a survey instrument was repeatedly distributed among participants actively seeking to increase their understanding of vocabulary, grammar, and morphology. With each treatment the collective of language speakers altered their organizational strategies, seeking to reduce the state gap between current organizational logics and perceived increases in fitness. When language loss was modeled as a common problem facing the speech community, its network demonstrated both progressive knowledge acquisition and retention strategies through complex self-organization. The emergent network structures greatly reduced geodesic distances, and therefore reduced the energy required to motivate, review, and distribute problem-solving resources such as information and access to non-local solutions. While many aspects of this research mirror complexity science, the strongest conclusions present visual evidence of a network instantiating resilience through new link formation that was neither randomly nor preferentially distributed.

Cognitive Social Structures THUR.AM2

Gender and Well-Being in Disaster Recovery: The Role of Social Networks

Chris McCarty, University of Florida

Contact: chrism@bebr.ufl.edu

Women are frequently more vulnerable and experience higher levels of stress than men in disaster environments. This is due in major part to culturally-derived gender roles involving responsibilities of maintaining networks and caring for others during crises when fewer familiar resources are available. This study delves deeper into women's roles in disasters exploring how gender and its relationships to well-being, mental health, and physical health face distinctive challenges in different social networks. We studied personal networks to better understand how formal external social support and informal local social support affect resilience. We interviewed over 450 people affected by landslides in one community in Mexico and by volcanic eruptions in one community in Mexico and five communities in Ecuador. Resettled women in both Ecuador and Mexico reported the overall lowest wellbeing for any network type, although there was considerable variation associated with network type. Subgroups were promising as a protective factor for resettled women in both Ecuador and Mexico, which further points to the role of personal networks. Non-resettled men, on the other hand, reported the highest wellbeing, followed by non-resettled women and resettled men. Gender effects varied by type of personal network in resettlements: in tighter networks, women had higher depression and more problems functioning; in structurally more open networks, women had higher post-traumatic stress, physical ailments, and no difference in functioning. The interplay of personal networks and gendered well-being in post-disaster resettlements helps to understand the dynamics of vulnerability, community sustainability and resilience.

Collaboration and Coordination THUR.AM2

Collaboration and Coordination THUR.AM2

Antecedents of Performance Information Use in Collaborative Networks: A preliminary analysis

Manabu Nakashima, University at Albany - SUNY

Contact: mnakashima@albany.edu

The purpose of this study is to explore what factors lead to performance information use in collaborative networks, focusing on the effects of interaction patterns and relational characteristics among network participants. Collaborative networks (network forms of organization) are often used to deliver public services in various policy areas such as economic development, environmental protection, health and human services (Agranoff and McGuire 2003; Feiock and Scholz 2010; Provan and Milward 1995). The strength of collaborative networks is their ability to address complex social problems through accessing and mobilizing a broad range of resources, information, and skills (O'Toole 1997; Weber and Khademian 2008). However, collaborative networks do not necessarily provide efficient and effective public services due to coordination and cooperation problems. Since collaborative networks face the performance problem, it is recognized that assessing collaborative networks' performance is essential (Provan and Sydow 2008). To improve network performance, information produced by performance measurement or evaluation needs to be used (Koliba 2011; Page 2008). Using a case of health and human service network, we examine what factors explain performance information use among the 21 network participants in the collaborative network. Our results from a Exponential Random Graph Model show that (1) when an actor (ego) frequently communicates with an actor who uses performance information, the ego is more likely to use performance information due to socializing or learning effects; (2) the actors in central positions are more likely to use performance information because they consider that using performance information is appropriate to make intelligent decisions.

Collaboration and Coordination THUR.AM2

Gap between Planned and Realized Networks and Determinants: Comparative analysis of Haiti and Japan Disasters

namkyung oh, University of Akron, Eunju Rho

Contact: namkyun@uakron.edu

There is a gap between planned network and realized network and this gap presents some challenges to lead public agencies in emergency management systems. Disaster response systems are composed of planned-official and unplanned-self organized interactions that widen the gap between planned and realized networks. In guiding inter-organizational collaboration and coordination, disaster response systems need principles that govern interaction structure of disaster response systems. To provide humanitarian services to affected national countries, OCHA developed cluster model as a major principle that governed the relationships among participating international and national organizations. This study explores the issue of collaboration and coordination in international response systems and conducted a comparative case study of networks that formed following 2010 Haiti and 2011 Japan disasters. When earthquakes hit Haiti (2010) and Japan (2011), the Coordination of Humanitarian Affairs (OCHA) took a lead coordination role to provide international humanitarian assistance to domestic agencies of affected countries. Yet, there were some structurally meaningful differences between Haiti and Japan disasters response systems, and these variations present critical implications to developing and implementing principles for collaborative response to disasters. This study, with content analysis and social network analysis (SNA), explored how two response systems of Haiti and Japan were structurally different, how OCHA's coordination role was implemented in difference contexts, and what specific conditions of individual countries facilitated or prevented the deliveries of international humanitarian assistants to affected countries.

Collaboration and Coordination THUR.AM2

INSTITUTIONAL AND PROFESSIONAL HOMOPHILY IN THE FORMATION OF INTER-PHYSICIAN NETWORKS: AN EMPIRICAL STUDY

Valentina Iacopino, Catholic University of the Sacred Heart, Rome, Fausto Di Vincenzo, Daniele Mascia

Contact: valentina.iacopino@rm.unicatt.it

Modern healthcare is characterized by a great level of complexity due to the proliferation of specialties, professional roles, and priorities within organizations. Knowledge distributed across

units, directorates, and individuals needs to be integrated for performing clinical interventions. Both formal and informal mechanisms are in principle usable for the coordination of knowledge and tasks within organizational boundaries. The role of informal professional networks has been recently considered very important in this vein. In spite of the role that professional networks play for knowledge diffusion, several concerns still remain for the mechanisms through which they emerge within healthcare organizations. The aim of this study is to explore the homophily effects as antecedents of inter-physician professional network within healthcare organizations. We collected data on a community of around 200 physicians working in a Local Health Authority within the Italian NHS. We employed multiple Multiple Regression QAPs to explore the extent to which institutional and professional homophily influence the formation of inter-physician networks. Our findings confirm that institutional and professional homophily are significantly associated with inter-physicians networks. Physicians attending similar field of interest as well as belonging to the same organizational structure more likely establish professional relations. Finally, professional instead of institutional affiliation has been found as more relevant for establishing ties. Our findings should be considered in an organizational perspective, since they provide information useful for decision makers who are asked to manage their own organizations according to flows of information and knowledge shared.

Collaboration and Coordination THUR.AM2

Stability of co-authorship blockmodeling structure in time

Luka Kronegger, University of Ljubljana, Faculty of Social Sciences, Blanka Groboljšek, Anuška Ferligoj, Franc Mali, Patrick Doreian

Contact: luka.kronegger@fdv.uni-lj.si

Co-authorship as form of scientific collaboration presents the major interaction mechanism between actors at the micro-level of individual scientists. Wide range of mechanisms fostering collaboration produce different structures within general network. The dynamic nature of co-authorship networks presents an interesting problem when trying to analyze the properties of established, emerging and dissolving groups of co-authoring researchers in time. To analyze the properties of structure dynamics we used blockmodeling method (structural equivalence) with following of individual researchers through time (Kronegger et. al 2011) and stochastic actor based modeling of network dynamics (Siena) in which we modeled the effect of structural equivalence ("balance parameter") to formation of new ties (Ripley et. al 2013). The combination of both methods provides a fruitful interpretative value. In our research we observed and compared collaborative structures in complete longitudinal co-authorship networks for four research disciplines Mathematics, Physics, Biotechnology, and Sociology. Dataset gathered from national bibliographic system COBISS, spanning from 1996 to 2005, was split into two consecutive five-year intervals. The comparison of the results obtained by blockmodeling and SAOM (estimated "balance parameter" in Siena) show very similar results: very stable co-

authorship structure among physicists, vague structure in sociology and mathematics and somewhere in-between level of structural stability in biotechnology. Each of the disciplines has its own special features of network change. References Patrick Doreian, Vladimir Batagelj, and Anuška Ferligoj (2005): *Generalized Blockmodeling*. Cambridge: Cambridge University Press. Luka Kronegger, Franc Mali, Anuška Ferligoj, and Patrick Doreian (2011): Collaboration structures in Slovenian scientific communities *Scientometrics* 90 (2), 631-647. Ruth M. Ripley, Tom A.B. Snijders, Zsolt Boda, Andras Voros, and Paulina Preciado, (2013): *Manual for SIENA version 4.0* (version October 16, 2013). Oxford: University of Oxford, Department of Statistics; Nuffield College. <http://www.stats.ox.ac.uk/siena/>.

Innovation and Diffusion THUR.AM2

Innovation and Diffusion THUR.AM2

A social networks perspective on adoption of two-stage ditches in the Western Lake Erie Basin

Pranay Ranjan, <p>Graduate Student, School of Environment & Natural Resources, The Ohio State University</p><p></p>

Contact: ranjan.10@osu.edu

Two-stage ditches are an alternative agricultural drainage channel design which helps in improving drainage as well as ecological functions. Adoption and implementation of this agriculture best management practice (BMP) holds great importance in the Western Lake Erie Basin (WLEB) where about 70% of sub-watersheds have been reported to be severely degraded due to drainage practices. Much scholarly work has been done on collaborative environmental planning and its impact on adoption and implementation of BMPs. However, there is a lack of scholarly work on understanding adoption of agriculture BMPs, specifically 2-stage ditches, from the perspective of social networks of key decision makers of this BMP. The study demystifies the social networks of such key decision makers in 27 counties in the WLEB, and unravels the process of adoption of two-stage ditches. The data on social networks and individual attributes for this study is being collected through semi-structured interviews. The study is built on the premise that by using innovative methods such as collection of social networks data, and by using social network analysis tools, we can further our understanding of the process of diffusion of agricultural BMPs. The results from this study hold a lot of value for climate change adaptation measures in the WLEB.

Innovation and Diffusion THUR.AM2

Avoiding or schmoozing? The role of intellectually stimulating contenders for knowledge search patterns in innovation

Sebastian Schorch, Grenoble Ecole de Management, Barthelemy Chollet, Alexandra Gerbasi

Contact: sebastian.schorch@grenoble-em.com

For innovation, creative teamwork and the integration of diverse sources of knowledge is key to success. By consciously putting innovation teams in competition with each other, companies try to enhance their technological flexibility and attempt to increase the motivation and dedication of their employees. Some researchers however have voiced concerns about the benefits of internal competition for innovation performance, as it may hinder knowledge sharing and the

spread of ideas between teams (e.g. A. Hargadon & Sutton, 2000). In a longitudinal network study of 157 business students in an innovation competition, we find that the perception of an alter as contender indeed reduces subsequent communication. We do however also find that alters who are perceived as intellectually stimulating and as contender at the same time, are the most sought after individuals for subsequent communication (controlling for subject and process knowledge). Theoretical and practical implications of intellectual stimulation as moderator for communication with contenders are discussed.

Innovation and Diffusion THUR.AM2

Information Dissemination in Social Media: Hubs and Demagogues

Yuki Yasuda, KANSAI UNIVERSITY

Contact: yyasuda@ninus.ocn.ne.jp

Social media often works as an efficient disseminator of new information via its weak ties. However, this efficiency is not always functional from the viewpoint of societal influence process. This presentation will examine how dissemination by demagogues occurred and how hubs contributed to the rapid and widespread information diffusion in social media, namely Twitter. Just after the Great East Japan Earthquake, March 11th, 2011, a false rumor came into existence concerning an explosive fire of oil tanks in the Tokyo Bay area (a by-product disaster of the earthquake), which says the heavy smoke caused by the fire includes toxic materials and will be dangerous when it is mixed into rain. We crawled 40,711 demagogue-related tweets on this fire using TTC, in order to examine hubs' role in quick information diffusion. We found the role was impressively strong. Furthermore, we revealed that powerful information diffusion was caused by those we labeled "ignorant influencers" who have a large number of followers but displays little knowledge. They are not opinion leaders nor market-mavens. That means the influencers' power and their knowledge/ accuracy level are independent. At a micro level, ignorant influencers do little harm, yet, at a macro level, when they are aggregated, they can cause serious information distortion in social media. In the case we examined, without any realistic/ logical risk estimation, the tweets in question diffused very fast and wide.

Exponential Random Graphs THUR.PM1

Exponential Random Graphs THUR.PM1

A Central Limit Theorem for Exponential-Family Random Graph Models with Local Dependence

Michael Schweinberger, Department of Statistics, Rice University, Mark Handcock

Contact: michael.schweinberger@rice.edu

One of the most striking properties of exponential-family random graph models with Markov dependence is that distributions of sufficient statistics, such as the number of edges and transitive triples, do not concentrate much mass around the expected values of sufficient statistics, but tend to be multimodal and concentrated on extreme graphs. It is well-known that the problem is rooted in the dependence structure of models. In contrast to related models in spatial statistics and time series, the dependence structure of models tends to be more global than local in nature and is therefore problematic. We take first steps to characterize local dependence in random graph models, inspired by the notion of bounded neighborhoods in spatial statistics and M-dependence in time series. We demonstrate that local dependence endows random graph models with desirable properties by establishing a Central Limit Theorem for random graph models with local dependence. The Central Limit Theorem suggests that random graph models with local dependence place much probability mass around the expected value of statistics, such as the number of edges and transitive triples. Therefore, random graph models with local dependence are promising alternatives to the problematic exponential-family random graph models with Markov dependence. In addition to theoretical results, we present simulation results and applications to real-world networks with ground truth.

Exponential Random Graphs THUR.PM1

Asymptotic Bayesian Inference for Pooled ERGMs

Carter Butts, University of California, Irvine

Contact: buttsc@uci.edu

Joint estimation of ERGM parameters from multiple realizations (i.e., pooled estimation) is important both in its own right and as a building block to hierarchical models. Traditional estimation methods based on MCMC-MLE are difficult to apply in the pooled case because of the high computational cost of simulating multiple graph realizations; this is a particular

problem when the graphs themselves are of large order, and/or when the number of realizations is large. On the other hand, the large number of data degrees of freedom available in the typical pooled setting, and the independence of edge variables across realizations, suggests the potential for approximate inference strategies based on asymptotic properties of appropriately subsampled sets of edge variables from the full set of available data. Here, I introduce a non-MCMC approach to asymptotic Bayesian inference for pooled ERGMs that scales to very large graph sets. The technique allows for specification of conditional conjugate priors that are both flexible and easily interpretable, and the resulting posterior quantities (including Bayes factors) are easily calculated in the large-data limit. Via a simulation study, I explore the performance of the technique under minimally informative priors, and demonstrate the impact of alternative subsampling strategies. Practical guidelines for use and directions for improvement are discussed.

Exponential Random Graphs THUR.PM1

Many snowballs make light work: a technique for large networks

Alex Stivala, The University of Melbourne, Peng Wang, Johan Koskinen, Garry Robins, David Rolls

Contact: stivalaa@unimelb.edu.au

The exponential random graph model (ERGM) is a useful statistical model for analyzing social networks. However, estimating ERGM parameters is a computationally intensive procedure that imposes severe limits on the size of networks that can be fitted. Furthermore, the best methods for computing such estimations are based on Markov chain Monte Carlo methods that are inherently sequential, which limits the ability to apply parallel computing. Recently, it has been shown that conditional estimation can be used to estimate ERGM parameters of a network by estimating parameters for smaller conditionally independent subsets of the network. One convenient method of generating approximately independent subsets is snowball sampling, and the conditional estimates of these samples may then be taken as independent estimates of the same model, and pooled using a weighted mean. A consequence of this design is that estimation of a large number of relatively small samples can be conducted in parallel, thereby not only allowing estimation on much larger networks than previously possible, but also allowing the application of parallel computing to speed up the process. Here we discuss our parallel implementations of ERGM parameter estimation using snowball sampling to allow parameters for very large networks to be estimated. We show that meta-analysis can be used to obtain estimates that adequately represent the data, by applying our methods to simulated networks with known parameters, and also demonstrate the application to networks that are too large to find social circuit and other more advanced ERGM specification parameters for directly.

Exponential Random Graphs THUR.PM1

Modeling Homophily in ERGMs for Bipartite Networks

Rashmi Bomiriyi, Pennsylvania State University, Shweta Bansal, David Hunter

Contact: rpb5129@psu.edu

Bipartite networks, in which the nodes can be decomposed into two disjoint sets with edges existing only between the two sets, represent an important tool for network modeling of real-world processes such as affiliations, collaborations and co-location. Frequently, we would like to model the propensity of similar nodes to form links among themselves, a tendency referred to as homophily. Modelling homophily in a bipartite network can be non-trivial because of the prohibition of the direct ties between nodes in the same subset. This paper introduces a method for modelling homophily in the commonly used framework known as Exponential Random Graph Models (ERGMs). We argue that the "natural" approach to modelling homophily, in which we incorporate the total count of matching two-stars into an ERGM, might be problematic due to potential degeneracy issues. We introduce a new set of terms for the ergm package in R designed to model homophily while avoiding such issues. We demonstrate that these terms can be expressed in a curved ERGM form, then discuss a few real world applications and a simulation study to assess the performance of the new terms.

Exponential Random Graphs THUR.PM1

Simultaneous inference on network dynamics and initial conditions

Alberto Caimo, Faculty of Economics, University of Lugano, Lugano, Switzerland, Johan Koskinen, Alessandro Lomi

Contact: acaimo.stats@gmail.com

In dynamic networks the presence or absence, creation or deletion, of ties between nodes are subject to both endogenous network dependencies as well as dependencies stemming from the spatial or temporal embedding of nodes. The statistical models that have been developed for networks repeatedly observed through time present us with two problems. Firstly, a model for change over time is most easily defined relative to some initial condition thus skirting the issue of where the first network came from. Secondly, longitudinal network models do not explain changes in the dynamics itself. As a consequence trends, cycles and other forms of longer-memory time dependence are difficult to capture. We present initial conditions and time-dependent dynamics as coupled problems in longitudinal network models. We also specify and test an extension to the longitudinal exponential random graph model (LERGM) that allows for simultaneous inference of the changes over time and the initial conditions. The new model

implies relaxation of assumptions of time-homogeneity. The LERGM may be estimated conditional on the initial conditions using Bayesian data augmentation. We demonstrate how the model may be extended to include the initial conditions while still being estimable by drawing on a Bayesian estimation scheme for cross-sectional exponential random graph models. To capture the change in dynamics we propose a hierarchical model describing how parameters change over time. We develop the model in the context of data on foreign direct investment (FDI) relations in the global electricity industry observed during the period 1995-2003.

Geographic and Social Space THUR.PM1

Geographic and Social Space THUR.PM1

Reproduction of the Milgram experiment in French students' world

marie-pierre BES, ISAE & LISST, Gautier Letarouilly, Daniel Pulido

Contact: marie-pierre.bes@isae.fr

France is commonly said to produce elites isolated from the society (Bourdieu, Suleiman), because of a selection system after high school, which would send the best students in elite classes and others in less selective Institutions. To test this hypothesis on a specific case, we chose to reproduce Milgram's experiment, following two types of chains: one from students in Engineering Schools to students involved in less selective trainings; the other in the opposite direction. After introducing the methodology (follow-up by email, motivation of links blockers, double chains, interviews with participants, etc.), we will mainly focus on explaining the incompleteness of chains: - Why do so few chains manage to reach their target? - How do the chains start? - How do geographic and "social" criteria influence the way of achieving the target? - How do the participants choose their future recipient? The analysis of the transfers allows underlining the systematic way through the capital town Paris, the concentration in the age bracket 18-25, the use of childhood friends and high school and also homophilia in exchanges. Finally, this experiment indicates that it is easier for the students Engineering Schools to contact other trainings than the reverse, as if it was easier to "go down" in the trainings' hierarchy than to climb it (Lin). It confirms partially the hierarchy of French education system but not its separation.

Geographic and Social Space THUR.PM1

Structural theory and reconstructing intra- and inter-island connectivity in archaeological networks

Viviana Amati, University of Konstanz Computer & Information Science University of Konstanz Box 67 78457 Konstanz, Germany, Termeh Shafie, Ulrik Brandes

Contact: viviana.amati@uni-konstanz.de

Archaeological networks are often built from partially observed data and therefore they rely on the integration of multiple sources of information (e.g., historical documentation, ceramics and faunal remains) considered as evidence of ties existing in the past. Most models for the reconstruction of spatial networks in Archaeology infer ties from hypotheses concerning

geographical distance (e.g., Gravity model and Proximal Point Analysis model), or more generally on costs and benefits of each single tie (e.g., Ariadne model). However, the dependency among ties cannot be solely based on elements concerning geographical proximity or resource availability. For this reason, we apply Burt's Structural Hole argument (Burt, 2000) and extend the Gravity model of Evans T., Rivers R. and Knappett C. (2012, *Advances in Complex Systems*: 15(1)) to reconstruct island network in the past. In particular, two distinct triadic statistics are introduced, namely local and bridging triangles, which allow the modeling of intra- and inter-island connectivity. We analyze the effects of these statistics on the reconstruction of exchange network of Southern Aegean Middle Bronze Age (MBA) and compare the results. This approach also allows us to consider plausible scenarios about the cohesion within and between islands.

Geographic and Social Space THUR.PM1

Student Mobility Patterns in the U.S. Postsecondary Education Network: Using Geographical Network Analyses at the Population Level

Manuel Gonzalez Canche, The University of Georgia

Contact: msgc@uga.edu

Attracting non-resident students brings institutional, local, and state-level benefits. Studies on student mobility patterns in the U.S. have analyzed factors influencing this mobility as a function of institutional and state level characteristics. While IPEDS lists nine sectors that comprise the postsecondary education system, our current understanding of student mobility patterns has been based on samples of only two of these sectors: public and private not-for-profit 4-year institutions. Consequently, researchers have not yet considered the intrinsic dependence that characterizes the student mobility of the entire system. The main thesis of this study is that the entire population of the non-resident postsecondary education market can be conceptualized as a network in which the connections are characterized by states "sending" students to institutions located out of state (state-sender→institution-receiver). This network falls under the category of real-world or complex networks which differs from small networks, typical of most social network studies, by involving highly dynamic connections between actors or units. This way of conceptualizing the non-resident student market allows to capture and model the lack of independence that characterizes the analysis of networks. More importantly, this approach renders centrality measures that may better inform our understanding of influence and competition in the attraction of non-resident students in the post-secondary education network. The geographical network and statistical analyses performed in this study proved to be useful in detecting patterns in the data that have not yet been detected with traditional methods. In particular I find that spatial location influences centrality variation at state/institutional levels.

Geographic and Social Space THUR.PM1

What Structures Network Structure? How Culture, Class, and Context Influence the Creation of Social Capital

Jennifer Schultz, University of Arizona, Tucson Udall Center for Public Policy Native Nations Institute

Contact: jschult1@email.arizona.edu

Though it is not often explicitly considered by Social Networks Analysis, most social interaction through the course of a day (or a lifetime), is passively guaranteed by the social settings a person habitually enters. Virtually all relationships, whether “weak” or “strong”, grow out of repeated interactions that happen in a particular setting. I analyzed respondents’ personal communities using in-depth interviews and a technique pioneered by Spencer and Pahl (2010) called a “social map”. I find that settings are influential in how and whether respondents’ relationships were maintained over time. The number of settings, degree of overlap among settings, and other characteristics of the settings respondents were engaged with also impacted relationship resilience among respondents. Respondents’ practices, seemingly peripheral to the relationship itself, could influence maintenance of relationships. For example, respondents who were willing to introduce relationships forged in one setting to those forged in another, and respondents who were able to parlay relationships initiated within one setting to relationships that exist in multiple settings fared the best in terms of relationship resilience. Socioeconomic status appeared to mediate respondent’s engagement with settings in unexpected ways. Finally, I suggest ways Social Network Analysis might further investigate the relationship between settings and social capital.

Geographic and Social Space THUR.PM1

Geographic and social network analysis of street people in Winnipeg, Canada

Jay Thompkins, Penn State University, Ann Jolly, Justine Blanford

Contact:

Background: Transmission of sexually transmitted infections (STIs) and bloodborne pathogens (BBPs) occurs through intimate contact between infected and susceptible individuals. Studies focusing on respondent-driven sampling have explored transmission of infectious diseases through social connections. We test the feasibility of correlating social network structure with geographic locations frequented by people at high risk of infection. Methods: Two respondent driven samples of 600 and 226 street youth, men who have sex with men (MSM), injection drug users (IDU) and homeless people were obtained in Winnipeg and Ottawa, Canada. Social

network and geographic analysis of connections between individuals and their residences, injection venues, and hangouts or 'pickup' locations was conducted. Sites were weighted based on the number of times they were mentioned and on betweenness centrality, calculated using Pajek network analysis software. ArcGIS software was then used to perform Kernel Density Estimation (KDE) analyses, interpolation of values from the geocoded network of points into a 'surface' representing spatial importance in the social network. Results: 559 sites were successfully geocoded in Winnipeg (93.2%) and 216 sites in Ottawa (95.6%). Roughly 8% of responses in both cases were geocoded despite spelling or spatial errors in the responses. The use of GIS software tested the feasibility of KDE in identifying the congruence of spatial location to centrality of individuals in high-risk networks. Conclusions: A high proportion of marginalised groups involved in sensitive and/or illegal activities in two Canadian cities reported accurately on specific locations where high risk activities took place, despite the potential for police harassment at these locations.

Innovation and Diffusion THUR.PM1

Innovation and Diffusion THUR.PM1

How does the network structure affect firm performance and innovation incentives in transition countries? The case of Armenia.

Tatevik Poghosyan, UN University MERIT/IDRC

Contact: tatevick@yahoo.com

The study examines the case of Armenia's economic transformation during the process of transition focusing on the changes in firm's board member network and its impact on the firm performance. In this study, we plan to answer the following questions by studying post-privatization Armenia: (1) does corporate network affect industry output? (2) How inter-firm collaboration enable the firm to innovate and to learn? (3) Does sharing board member make collaboration more likely? Answering these questions will deepen our understanding of the roles of non-market mechanisms in the economy where firms face political, economic, institutional uncertainties, without much knowledge and experience of market economy. Our previous study answered the first research question partially. The study examines the impact of board member network on the performance of Armenian corporations in the post privatization period, based on the initial structure of board member network formed in 2000. For the second and third research questions we are developing theoretical and empirical approaches. Current paper will discuss more the empirical part. The empirical analysis will test whether the embeddedness of firms in the network structure affect firm's performance and innovative activity. Empirical studies suggest that participation in alliances has a positive effect on innovation (Shan et al, 1994). Powel et al (1996) demonstrates the value of being deeply embedded in rich network for innovative performance.

Innovation and Diffusion THUR.PM1

Innovation Networks (INs) of second-generation ethanol

Luiz Gustavo Souza, Universidade Estadual de Campinas (UNICAMP), Márcia Azanha Moraes, Maria Ester Dal Poz, José Maria Silveira

Contact: luizgustavoeco@gmail.com

The increasingly demand for biofuels in next decades places the second-generation (lignocellulosic) ethanol obtained from the converting process of biomass as an advanced fuel. In fact, the competitiveness to obtaining new sources of bioenergy could place the producers in

an advantage position, because many capabilities that are used to producing first-generation ethanol could be a first step to produce the second one. The evolutionary economic literature guides that there are some network gains between authors through a scientific collaboration. Therefore, countries that are engaged to second-generation ethanol could be in a better position if they can exchange information and knowledge through a scientific collaboration network – the Innovation Networks (INs). The aim is to analyze the state-of-art of second-generation ethanol under the formation of INs using international papers database of ISI Web of Science to a selected group of countries. The methodology emerges from Social Network Analysis (SNA), once authors, countries and institutions have intrinsic incentives to share information in the process of creating a new paper in partnership. The Innovation Networks reveal that United States places the better position than other countries. This position reflects the many efforts (environmental, social and economic) in the process of delignification, which is technology-intensive as well, an important interaction in three institutional spheres (University-Government-Enterprise).

Innovation and Diffusion THUR.PM1

Network analysis of the genetic innovation system in the Scottish beef sector

Fiona Borthwick, SRUC

Contact: fiona.borthwick@sruc.ac.uk

Genetic techniques such as Estimated Breed Values (EBVs) have led to significant improvements in livestock breeds globally. This has led to subsequent improvements in products, profits, and potentially carbon management. Certain livestock sectors in Scotland have been quicker to adopt these techniques - particularly the pig, poultry and dairy sectors. Uptake in the beef and sheep sectors in Scotland is lower. This study investigates the barriers to uptake of EBVs in the beef sector. It takes data from a multi stakeholder workshop where participants were asked to map the actors and flows between actors for the beef sector. This study applies the 'innovation system' approach and compares actor interaction. It aims to investigate the micro level of actor interaction through network analysis of the flows that exist between the actors in the beef innovation system. Social network analysis is used to look at multiple relations in an innovation system with the aim to identify systems failures. Innovation systems recognise the need for mutli actor approaches to innovation. Individuals, organisations, artefacts and institutions play different roles. Innovation is a process of collaboration between a range of actors. Previous studies based on this data have identified a number of innovation systems failures in the sheep and beef sectors in Scotland. By carrying out a social network analysis these failures can be explored at the micro level. This research has implications for agricultural knowledge exchange and innovation, which are important for rural development as well as policy responses to climate change.

Innovation and Diffusion THUR.PM1

Symbolic and Substantive Adoption of Managerial Practices

Arturo Briseno, Tecnológico de Monterrey EGADE Business School sede Monterrey

Contact: arturo_uat@yahoo.com

Organizations may adopt management practices substantively or symbolically. The institutional theory literature explains that organizations adopt practices in a substantive way due to technical reasons, while symbolic adoption is due to institutional pressures for legitimacy. Despite the efforts to understand symbolic and substantive adoption of organizational practices, the current literature does not associate symbolic and substantive adoption with the evolution of network structures over time. Failure to consider network dynamics leaves the mechanism for the transition from substantive adoption to symbolic adoption unexplained. Consequently current accounts of practice adoption are incomplete. This paper extends theory about practice adoption in two ways. First, it ties practice adoption to two models of contagion namely, substantive adoption occurs via structural equivalence, while symbolic adoption occurs via cohesion. Second, the transition from substantive to symbolic adoption over time is density dependent, so that contagion by structural equivalence occurs more often at low densities, while contagion by cohesion occurs more often at higher densities. The increasing density of adoption over time explains why early adopters tend to do so for technical reasons, while late adopters do so to be seen as legitimate. The paper concludes by discussing the implications for practitioners who will be better able to develop appropriate interventions to ensure substantive adoption even at later stages in practice diffusion.

Innovation and Diffusion THUR.PM1

The Social Organization of Legitimacy in Police Work Groups: Using Signed Graphs to Examine the Structure of Police Officer's Perceptions of Technology

Jacob Young, School of Criminology and Criminal Justice Arizona State University

Contact: Jacob.Young.1@asu.edu

On-officer videos, or body cameras, provide objective accounts of interactions among police officers and the public. However, getting endorsement from patrol officers is difficult, as these devices are often perceived as systematic attempts to limit discretion and sanction line officers for trivial policy violations. At the same time, police leadership tends to view this emerging technology as an avenue for resolving untruthful citizen complaints and prosecuting offenses where victims and witnesses are reluctant to testify. These incongruent cognitive-frames are a cultural barrier to the utilization of innovative technologies. Understanding the mechanisms

that lead to the deconstruction of these barriers is essential for the integration of technology into organizations. We argue that interaction with other officers provides a conduit for facilitating cognitive frames of cameras as legitimate and that these structures can be operationalized using signed graphs. Using affiliation data collected from a large police department in the Southwestern United States, we examine the social organization of perceptions of body cameras in work groups (i.e. co-incident networks). These networks provide a device for understanding cultural holes that may exist in the department regarding the framing of body cameras as legitimate and may also illustrate how officers become embedded in cultural structures that influence their behavior regarding the use of technology.

Interlocking Directorates THUR.PM1

Interlocking Directorates THUR.PM1

Capital Ties and Ownership in Germany Current Insights from the Bafin Database

Lothar Krempel, Max-Planck-Institute for the Study of Societies Paul Str.3 50676 Köln Germany

Contact: krempel@mpifg.de

Capital ties and directory interlocks among the largest German companies have decreased during the last two decades as a result of an ongoing financial liberalization and internationalization of capital markets. Since then international shareholders have significantly increased their holdings in public traded German companies. We identify central shareholder structures by analyzing the Bafin database to which natural and legal persons are obliged to notify their holdings of voting rights as soon as they rise above or fall below certain thresholds.

Interlocking Directorates THUR.PM1

Diversity among Corporate Directors in 2005

Roy Barnes, Department of Sociology University of Michigan-Flint, Cordell Harris

Contact: rcarnes@umflint.edu

This paper explores the gender and racial diversity among the largest corporations in the United States across a wide variety of sectors in 2005. After describing the network of interlocking directors in this time period, the descriptive results reveal interesting differences. On the one hand, women and directors of color – though relatively small in number compared to all the directors – have the higher average degree centrality and the lower average geodesic distance than white males. On the other hand, women and directors of color possess substantially lower rates of serving as executives within their corporate boards. To further investigate the structural importance of these underrepresented directors, the paper reports the distribution of brokerage roles based on two dimensions. The first examines the incidence of coordinator, itinerant broker, representative/gatekeeper, and liaison roles based on a sex-race variable, and secondly, with a sex-race-executive status variable. So, while women of color may be underrepresented in the network of directors, they may be in positions to inordinately benefit from their configuration of ties with other directors.

Interlocking Directorates THUR.PM1

Peculiarities of the British: A Comparative Analysis of the Evolution of Director Interlocks in the UK and US 2002-2012.

Bruce Cronin, University of Greenwich

Contact: b.cronin@greenwich.ac.uk

With a high dependency on financial services, the UK corporate sector was particularly hard-hit by the global financial crisis of 2008. While most subsequent attention has focused on the regulatory and ethical short-falls surrounding the crisis, there was also extensive disruption to the long-standing informal social relationships that have contributed to the particular character of the UK corporate elite (Cronin 2012). Earlier research has documented the way the financial crisis fractured the large network of director interlocks that had contributed to a degree of national unity among the corporate sector (Cronin 2010). But at the same time, despite the exit of important financial institutions, the remaining core of the elite became more cohesive (Comet and Cronin 2013). This paper extends the investigation of the effects of the financial crisis on the informal governance structures of the UK corporate elite by a means of a comparative analysis of the evolution of the director interlock networks in the UK and the US from 2002-2012. The structure of director interlocks in the UK and US are frequently classified as similar, arising from a distinctive Anglo-American capital market institutional regime (Scott 1986, Windolf 2002). At the same time the economies differ greatly in size, structure and history and the US has much more prescriptive corporate governance regulation, particularly with regard to board composition. So the evolution of the director interlock network in each country is likely to differ considerably in times of stress. The analysis of these differences, then helps isolate the 'peculiarities of the British' corporate elite. The period encompasses the Sarbane-Oxley corporate governance regulation in the US, the financial services boom of the 2000s and the global financial crash. MRQAP longitudinal models are employed.

Interlocking Directorates THUR.PM1

The Decline of the American Corporate Network

Mark Mizruchi, University of Michigan, Todd Schifeling

Contact: mizruchi@umich.edu

The density of the U.S. corporate interlock network has declined sharply in recent years, especially since the mid-1990s. This trend is consistent with a decline in density found in several European countries. This decline reflects what I call the "fracturing of the American corporate elite." In the period after World War II, leading American corporations were

relatively cohesive and were capable of collective action, in part due to the pressures they faced from a highly legitimate government, a relatively strong labor movement, and a financial community that served as a source of normative consensus. They also adopted a generally moderate and pragmatic approach to politics. This system broke down in the 1970s, as the system experienced a range of exogenous shocks. In response, the corporate community mobilized, actually increasing its cohesion, and the group succeeded in weakening organized labor and reducing government regulation. Having succeeded in defeating its sources of constraint, however, it was no longer necessary for big business to be politically organized, and the group became increasingly fragmented. This fragmentation was exacerbated by the decline of the banks as a source of consensus and a massive acquisition wave that decimated corporate management. The American corporate elite of the present day is a shadow of its former self. Individually, American businesses are extremely successful in securing favors for themselves. Collectively, however, the group is no longer capable of dealing with system-level crises, such as health care, the deficit, or extremist politics.

Interlocking Directorates THUR.PM1

Small Worlds Characteristics in Interlocking Directors Networks

Sana Elouaer-Mrizak, University of Technology Belfort-Montbéliard, Marc Chastand

Contact: sana.elouaer@univ-amu.fr

The paper examines the small world structure in networks of interlocking directors networks. These networks can be represented by a two-mode network of directors and firms. The aim is to find sub-groups within these networks. To do so, we consider the network of French firms listed in the Financial Index CAC40. Using Robins and Alexander (2004), we compared main structural properties of French, European, US and Australian interlocking company directors. We conclude that there are differences between French, European and US, Australian networks. Especially, different structures are likely to be influenced by the clustering of directors on boards, rather than the number of positions by one director; that shared multiple board memberships (multiple interlocks) are an important feature of these different infrastructures.

Personal Networks and Disasters THUR.PM1

Personal Networks and Disasters THUR.PM1

Perceiving Risk through the Lens of One's Personal Network

Eric Jones, University of North Carolina at Greensboro

Contact: ecojones@uncg.edu

Social influences on risk perception are understudied, and personal networks are one approach for capturing those social influence. We examined network correlates of risk perception in a total of seven sites among communities affected by a flood in Mexico (one site) and volcanic eruptions in Mexico (one site) and Ecuador (five sites). We conducted over 450 interviews with questions about the danger people feel at the time (after the disaster) about what happened in the past, their current concerns, and regarding their expectations about the future. We explore how aspects of the context in which people live have an effect on how strongly people perceive natural hazards in relationship with demographic, well-being, and social network factors. Generally, our research indicates that levels of risk perception for past, present, and future aspects of a specific hazard are similar across these two countries and seven sites. However, these contexts produced different predictors of risk perception—in other words, there was little overlap between sites in the variables that predicted the past, present, or future aspects of risk perception in each site. Network variables were mainly associated with perception of past danger (rather than present or future danger), although specific network correlates varied from site to site across the countries.

Personal Networks and Disasters THUR.PM1

Post-Disaster Reciprocity and the Development of Inequality in Personal Networks

Arthur Murphy, University of North Carolina at Greensboro

Contact: admurphy@uncg.edu

Exchange is often seen as a way for farmers and the poor to acquire necessary labor and other resources without the use of currency. However, inequality in the sharing of labor and other resources may lead to a variety of possible unequal economic arrangements. We examine reported exchange relationships in chronic and acute disaster settings. We looked within personal networks at the sharing of informational, material/tangible, and emotional support, as well as whom was offered work. One goal was to see if differences exist in the nature of exchange in highly impacted vs. less impacted sites, but we also are concerned with some other

major contextual differences in seven disaster-affected sites (e.g., Ecuador vs. Mexico, rural vs. urban, resettled vs. non-resettled) as we explore the extent to which exchange between individuals in different kinds of personal networks serve to perpetuate an existing class structure, since class structure is a major component of disaster recovery opportunities and constraints. Our results suggest that the development and maintenance of inequality occurs through the accumulation of everyday work relationships, many of which are indirect, as well as through differential distribution of various kinds of support. In Ecuador, the relationship between unidirectional work relationships (not reciprocal) between wealth levels and unidirectional work relationships within the same wealth level was higher than in Mexico. The difference between the two countries suggests that exchange in Ecuador has a greater tendency to re-enforce class status in the small villages we studied than it does in Mexico.

Personal Networks and Disasters THUR.PM1

Gendered Paths to Formal and Informal Resources in Post-Disaster Development in the Ecuadorian Andes

Albert Faas, North Carolina State University

Contact: ajfaas@gmail.com

Gender is an important factor in power relations everywhere and specifically important in disaster and resettlement contexts because it has implications for the distribution of scarce resources and therefore recovery or wellbeing. Gendered social networks differentially access formal and informal resources and information, thus affecting vulnerability to disasters and resettlement. Our study took place in five communities in the Andean highlands of Ecuador that were affected by volcanic disasters in 1999 and 2006. We found that men dominated access to institutional support in resettled sites. Where formal institutions have promoted women to positions of leadership, wider social structures of reciprocity, outside labor recruitment, and informal social support remain unchanged. Previously marginal individuals and households have acquired productive resources and political influence in the resettlement, though social structures have not become more inclusive per se. In general, our findings beg for targeted strategies of increased access to formal support for women and female-headed households.

Personal Networks and Disasters THUR.PM1

Awareness of Social Capital during Hurricane Sandy

Maria Dwyer, , Lora Appel, Punit Dadlani, Keith Hampton, Vanessa Kitzie, Ziad Matni, Rannie Teodoro

Contact: mia.dwyer@rutgers.edu

Track: Social Support This study explores variations in awareness of bonding and bridging social capital during and after a major natural disaster. We compared reported levels of bonding and bridging social capital at the height of a natural disaster to levels one year after the disaster. One week after Hurricane Sandy left large parts of the U.S. East Coast without power, flooded, and with water and fuel shortages, a sample of 880 undergraduate students at a large northeastern university were administered a survey designed to measure perceived social support, bonding, and bridging social capital. A second survey was administered to a sample drawn from the same population one year later. The survey included the MOS social support scales, two name generators (important matters and especially significant ties), and a resource and a position generator. Our findings suggest that there is surprising stability in measures of social support, bonding and bridging social capital reported during a natural disaster in comparison to what is reported after the disaster has subsided.

Personal Networks and Disasters THUR.PM1

Community Networks: How Disaster-Affected Villages are Connected and Separated through Personal Networks

Graham Tobin, University of South Florida

Contact: gatobin@usf.edu

In disaster environments, high levels of interaction may prove beneficial to disaster survivors who receive support from non-impacted people that live outside the risk zone. As such, community networks indicate both the degree and potential of extra-community interaction. We studied seven resettled and long-time communities in Ecuador and Mexico impacted by floods and volcanic eruptions. We compared characteristics of the networks of the different villages. Network characteristics varied between villages in terms of the percent of unique people named in each village, but also varied by a number of other factors including whether villages were comprised of resettled people or non-resettled people following disasters. Preliminary results show that large villages had less dense networks of strong ties than most other settlements, as would be expected mathematically. Betweenness centralization varied less when all nodes were included than when only those nodes cited as emotionally close were

included. Resettled sites had a lower percentage of people that were cited as emotionally close ties, as also might be expected. These patterns related to ethnographic data collected in each site to reveal the unique features of these various networks for accessing scarce resources in times of crisis and recovery. A greater understanding of such community networks may facilitate the implementation of particular support strategies and the effective distribution of disaster aid.

Policy Networks and Governance THUR.PM1

Policy Networks and Governance THUR.PM1

Fitting the mold: Using text network analysis to model university peer groupings

Jeffrey Harding, University of Georgia: Institute of Higher Education, Manuel S. Gonzalez Canche, Rob Stollberg, Dominique Quarles, Lucia Brajković

Contact: hardingj@uga.edu

Neoinstitutional theory suggests that organizations change for various reasons. Some choose to adapt or mimic strategies employed by prestigious peers. Others change based on pressure from exogenous forces. Both examples exist in higher education. In states with greater, centralized control over public colleges and universities, one would expect to see the latter adaptation more frequently. In such circumstances, universities may display subtle resistance to such rigid governance. This study considers this possibility in the state of Georgia, where, in the summer of 2013, the University System of Georgia (USG) exhibited organizational control by grouping member institutions based on the mission the USG believes those schools should serve. We use text mining techniques that allow us to create two-mode matrices or affiliation networks in which the columns would be key concepts that institutions value in their mission statement and the rows will be the institutions themselves. With the use of text network analysis and community detection algorithms, we evaluate whether the 31 public institutions in the USG have grouped themselves in the recently defined clusters or have followed another isomorphic pattern. This study demonstrates yet another way that social network analyses can be used to explain organizational behaviors and provides another potential tool for governing and coordinating boards to use in managing and guiding their institutions and resources.

Policy Networks and Governance THUR.PM1

Interorganizational meta-matrix in analyzing multi-level network governance

Naim Kapucu, University of Central Florida (UCF)

Contact: kapucu@ucf.edu

The purpose of this presentation is to investigate the role of actor capacity in an effective multi-level network governance. An interorganizational meta-matrix, developed on a systems-based approach to understand the design and functions of multi-level network governance, will be presented with application examples and potential use in interorganizational networks. The presentation will apply social network analysis to examine how structure, formal and informal

networks, and communities of practice help build an effective network governance. The multi-level network governance matrix will be used in explaining the multifaceted inter-organizational relationships in different context such as emergency management and capacity building. The presentation will detail the role of organizational capacity, leadership, informal and formal networks, and communities of practice in building effective multi-level network governance.

Policy Networks and Governance THUR.PM1

Network Dynamics and Change in Urban Development Politics: A Qualitative Multilevel Analysis to Collective Action

Bettina Lelong, ILS Research Institute for Regional and Urban Development/HafenCity University Hamburg

Contact: bettina.lelong@ils-forschung.de

Cities are continuously evolving formations. Change occurs mostly incremental, but sometimes more radical shifts transform the urban fabric. Considering the complexity of urban development processes, this paper asks for the conditions of collective action for urban policy change. To capture the structuring conditions, the paper employs Emirbayer and Goodwin's theoretical approach (1996) which conceptualizes social-structural, cultural and social-psychological contexts of action. The paper translates these contexts into a network-analytical methodology which combines structuralist concepts of social network analysis with the network governance approach and integrates constructionist approaches from both sociology and political science. The conceptual framework encompasses a qualitative, multilevel analysis (network structure, strategic network positions, network governance, network domains). By applying this analytical template, the paper explores conditions of collective action in two case studies (waterfront-redevelopments). Interpreting the empirical findings of the respective political implementation processes, it can be assumed that strategic networks aspired to overcome hegemonic network domains. The analysis reveals two types of networks which show an exclusive or inclusive logic of action. Apart from this general distinction, both cases indicate certain supportive conditions which consolidated the new urban development schemes. Regarding the methodology, the paper illustrates that the integrated analysis of actor configurations, cultural frames and social-psychological conditions helps discern a variety of constraining and enabling conditions on human agency. By including cultural aspects and network development the study contributes to the development of network theory. Concurrently, the concept offers an abstract and systematic method for governance research on an urban level.

Policy Networks and Governance THUR.PM1

Strengths and Weaknesses of Formal and Informal Support Networks in the Field of Informal Science Education in the United States

Timothy Podkul, <p>SRI International</p>

Contact: timothy.podkul@sri.com

Educators, policymakers, and funders of education initiatives are increasingly recognizing the importance of programs offering informal learning opportunities in broadening and enriching Science Technology Engineering and Math (STEM) learning. Unlike schools, these programs are not supported by systems that provide, for example, staff training, curricular materials, or sustained funding. Networks have become an increasingly common way for programs to join with advocates and others in the informal STEM education field to help fulfill such needs. An interest in understanding organic network structures in this field is seen as important by donors who then want to invest in prescribe network structures modeled on successful networks. This presentation focuses on network analyses of two National Science Foundation-funded informal science education projects representing the organic and prescribed networks. The first is the Afterschool Science Network, an investigation into the organic relationships between elementary and middle school afterschool programs and supporting science content specialists and institutions. The second is the structured Nanoscale Informal Science Education Network (NISE Net), which is comprised of research institutions, museums and informal science organizations, and other individuals who are interested in communicating with the public about nanoscale research. It currently has over 1000 members throughout the United States, who are affiliated with the network through topical and regional hub structures. This presentation will describe the structural and compositional components of these networks, benefits and drawbacks of certain features, and recommendations about the utility of prescribing network structure in the informal science field moving forward.

Public Health Networks THUR.PM1

Public Health Networks THUR.PM1

Social network analysis as a critical tool for tobacco control evaluation

Douglas Luke, <p>George Warren Brown School of Social Work</p><p>Washington University in St. Louis</p>, Bobbi Carothers, Jenine Harris

Contact: dluke@wustl.edu

Tobacco control in the United State, as well as around the world, is a complex system that is organized at local, state, and national levels. Network analysis is a particularly useful tool to use when evaluating the organizational processes and outcomes of these various tobacco control programs and systems. We present a series of case studies illustrating how we have used specific network analysis techniques to answer important evaluation questions in tobacco control. The following section describes each case study, including the relevant evaluation question and which network analytic techniques were used to address each question.

Evaluation Question: Network Analysis Technique Used

How to strengthen tobacco control leadership in agencies across the Departments of Health and Human Services: Network visualization, Measures of centrality, simple gap analysis

Identify common underlying communication and collaboration structures in state tobacco control programs: Simple block modeling, Analysis of multiple networks

How do state tobacco control programs change as a result of major budget cuts: Network visualization, Analysis of longitudinal network data

Identify predictors of collaboration among national disparities tobacco control networks: Exponential random graph modeling (ERGM)

Modeling diffusion of evidence-based guidelines among state tobacco control programs: Exponential random graph modeling (ERGM), Analysis of multiple networks

We will also discuss how the network analysis results were disseminated to various stakeholders, including the funding agencies (NCI, CDC), and the various state and national tobacco control programs.

Public Health Networks THUR.PM1

“Important people, difficult to work with”: Network governance in Indigenous health reform in Australia

Dean Lusher, Swinburne University of Technology

Contact: dlusher@swin.edu.au

There is growing evidence that providing increased voice to vulnerable or disenfranchised populations is important to improving health equity. In this paper we will examine the engagement of Aboriginal people and organisations in local governance in reforms associated with the Indigenous Health National Partnership Agreements (IHNPA) in Australia. The governance structures underpinning such interventions are rarely studied but are central to their conceptualization and to their success or failure and yet are rarely studied. We utilize multivariate exponential random graph models (ERGMs) because of their capacity to analytically delineate purely structural explanations of tie formation from explanations related to actor attributes. We analyse two networks – one of collaboration and the other of work difficulty – for organisations involved in state and local governance of Aboriginal health in Australia. We find that controlling for a range of network self-organisation structures that there is a strong entrainment effect of collaboration and work difficulty. Above and beyond this however we find that Indigenous organisations are both sought out as partner organisations with which to collaborate, but also that Aboriginal organisations are also much more likely to be seen as difficult to work with. Importantly, there is a strong absence of negative ties among Indigenous organisations which indicates that work difficulty is between non-Indigenous and Indigenous organisations. We discuss the importance and implications of these findings, highlighting the need to examine positive ties and negative ties in conjunction with actor attributes to understand the intricacies of these policy networks.

Public Health Networks THUR.PM1

A network modelling approach to social and organizational factors affecting implementation of Evidence-Informed Practice in a public health department in Ontario

Reza Yousefi Nooraie, McMaster University, Maureen Dobbins, Alexandra Marin

Contact: yousefr@mcmaster.ca

Objectives: to develop a statistical model on how managers and professional consultants seek information from peers to inform evidence-informed decisions in a Canadian public health department. Methods: The staff of a public health department serving a large urban population identified the names of other staff to whom they turned to get help informing their decisions,

the experts, and their friends. A statistical model was developed to predict the formation of information-seeking connections by personal characteristics of the seeker and source, and the structural attributes of the social networks. Results: The staff tended to seek information from the peers who were either in the same division, or in the supervisory/administrative division. The tendency of managers for being the information source was not significantly different from professional consultants, while the latter were more likely to be considered as experts. The staff of the supervisory/administrative division were significantly chosen as the information sources, while not necessarily as experts. The staff were more likely to seek information from those who implemented evidence based practice (EBP) principles in their daily practice. Conclusion: The analysis showed a communication network segregated by organizational divisions. Managers were identified frequently as the information source, even though this is not a part of their formal role. The extent to which a peer implements EBP in practice is a significant predictor of being an information source or an expert, implying a positive attitude and practice towards EBP.

Public Health Networks THUR.PM1

The Ties to Practice: An Examination of Network Ties and Implementation of Evidence-Based Practices in a Smoking Cessation Network

Robin Lemaire, Virginia Tech, Scott Leischow

Contact: robinhlemaire@gmail.com

While much has been learned about the importance of networks and network ties in improving tobacco control, the link between specific types of network ties and outcomes is still not clear. In this study, we combine network analysis with Qualitative Comparative Analysis (QCA) to examine the types of network ties that are associated with the implementation of evidence-based practices. We examine the North American Quitline Consortium (NAQC), a network spanning the U.S. and Canada that provides tobacco cessation services to clients through direct and indirect services. The main goal of NAQC is to facilitate the flow of information about research practices that are effective in getting people to quit smoking. Drawing on data collected on NAQC through a web-based survey at yearly intervals across a 3 year time period, we focus specifically on NAQC member organization's network ties to NAQC's Network Administrative Organization, to other quitline organizations, to key non-quitline organizations, and to tobacco researchers. We examine whether certain network ties matter for different categories of practice. Though QCA is not designed for longitudinal analysis, network tie combinations for each year will be extracted and compared across the three years to determine if the tie combinations associated with implementation vary over time. Results of the study and the implications for the role of network ties in the dissemination and implementation of evidence-based practices for improving tobacco control will be discussed.

Public Health Networks THUR.PM1

Contextual Conditioning of Adolescent Smoking Influence and Selection Processes

jimi adams, American University, David Schaefer

Contact: jadams@american.edu

Adolescents influence their friends' smoking behaviors, with studies showing smokers ability to influence uptake among non-smoking friends, and non-smokers generating cessation among their smoking peers. Additionally, adolescents select friends in ways influenced by their peers' smoking behaviors - with studies separately showing that smoking status itself can increase/decrease attractiveness of peers as friends, and friendship selection being driven by tendencies toward smoking homophily. Given this knowledge, interventions can be and have been targeted at leveraging these network effects to reduce smoking behavior. SIENA models can assess the empirical effects of in place interventions and simulate effects of proposed interventions over evolving populations. Here, we add another layer to this possibility by demonstrating how contextual factors - particularly differences in initial smoking prevalence at the school level - can alter the trajectories of network-based interventions. We separately assess (1) the independent effects of prevalence as a contextual moderator on smoking outcomes, given stable influence/popularity effects, and (2) how the effects generated by manipulating influence/popularity are altered when dependent on their association with initial conditions (i.e., recognizing that prevalence is rarely truly independent of initial conditions; and thus manipulating them in tandem based on empirically observed associations of peer effects and initial prevalence).

Visualization THUR.PM1

Visualization THUR.PM1

Improved visualization of multi-mode networks that entail geo-coded entities

Kiumars Soltani, <h3 class="r">University of Illinois at Urbana-Champaign</h3>,
Shaowen Wang, Jana Diesner

Contact: soltani2@illinois.edu

Visualizations of geo-coded networks are essential for exploring and understanding patterns of relationships between places or locations and other types of entities, e.g. social agents or information. The growing availability of big and thick geo-coded network data as well as improvements in online mapping technologies have made spatial network visualization one of the most common web-based visualization applications. Existing network visualization techniques imply the assumption that network data can be divided into two groups: first, networks where some geographical information is given for every node, e.g. transportation networks. In this case, after processing geo information, we can simply plot nodes on a map. Second, networks where no node has geographical information, e.g. co-authorship networks. In this case, networks are visualized according to alternative layout algorithms such as spring embedders. However, many real-world networks fall right in between: they entail some nodes for which geographical information is available and relevant, e.g. places that people have visited, and other nodes for which geographical information is irrelevant, such as peoples' knowledge and emotions. We are presenting a novel framework and implementation (GeoXViz) that addresses this issue by effectively visualizing semi-spatial networks. We plot geo-tagged nodes on a map and then use a label propagation-based method to assign multiple locations to each non-location nodes with their corresponding assignment strength. Then we produce a word cloud for each geo-tagged node after identifying the importance of its associated non-locations using meta-data weighting techniques (e.g. tfidf). This solution provides an intuitive visualization with details-on-demand functionalities per location.

Visualization THUR.PM1

Roads to Happiness: An experiment in mapping the social landscape

Jose Rodriguez, Department of Sociology University of Batrcelona

Contact: jarodriguez@ub.edu

This is an experimental paper mapping social landscapes and experimenting with a social cartography and social geography not dependent on, nor limited by, the physical or

geographical space. We use the systems of relations of three institutional social spaces to draw social maps using social networks tools. The first institutional space is that of two Buddhist sanghas (communities) and here we analyze the systems (or cosmologies) of meaning and of practices and the interrelation structure between them shaping what we could define as their Buddhist “identity” map. Mapping the Buddhist identity sets the landscape for the roads to happiness as well traveled combinations of meaning and practices. In the second one we view the scientific literature on happiness as a social space defined by interactions between actors (scientist and their papers) and concepts (cultural, economic, political) defining and measuring happiness and proposing actions to reach it. In the third, social networks becomes a tool for an experimental non-lineal causal approach. The network as a system of interrelations of causes, conditions and actions towards happiness with no dependent or independent variables. This will result in three types of maps. The first one depicting the roads towards happiness Buddhist practitioners are taking. The second one represents the scientifically sanctioned roads. And the third one focuses on the position societies are in their road towards happiness. The goal of the paper is to map social landscapes created by social interaction and in so doing advance in the design of social geographies and cartographies. Social Network Analysis is a very useful tool to represent the social space and the roads from one social point to another.

Visualization THUR.PM1

Using Networks in Representing and Analyzing Process Data for Educational Assessment

Mengxiao Zhu, Educational Testing Service, Zhan Shu, Alina von Davier

Contact: mzhu@ets.org

New technology enables interactive and adaptive scenario-based tasks to be adopted in educational measurement with the benefit of high validity, reliability and quality. At the same time, it is a challenging problem to build appropriate psychometric models to analyze data collected from these tasks due to the complexity of the data. This study focuses on process data collected from scenario-based tasks (SBT), which record activities and steps that students took in solving these tasks. We explore the potential of using concepts and methods from social network analysis (SNA) to represent and analyze process data. Empirical data was collected from the large-scale scenario-based, computer-administered assessment of Technology and Engineering Literacy (TEL) conducted as part of the National Assessment of Educational Progress (NAEP) project. For the activities sequences in process data, directed networks are created with nodes representing actions and directed links connecting two actions only if the first action is followed by the second action in the sequences. This study shows initial results of using SNA in visualizing process data and displaying the problem solving processes. This study also explores the potential of using the ideas from exponential random graph models (ERGMs) in identifying meaningful patterns in process data. Finally, this study discusses the insights these analysis can provide on task/item design.

Visualization THUR.PM1

Visualization and Analysis of Dynamic Networks in Cytoscape

Jimmy Morzaria, Birla Institute of Technology & Science, Sabina Pfister, Jason Montojo

Contact: morzaria.jimmy@gmail.com

In order to gain insight into the underlying processes in networks, social or biological, which are inherently dynamic in nature, researchers have recognized the need for network visualization tools to hypothesize and test their claims. We present “DynNetwork”, an application integrated in the open source network visualization and analysis software Cytoscape 3.0. Cytoscape offers an already well developed framework in which network structured data can be accessed, visualized, and analysed. “DynNetwork” adds to Cytoscape the functionality to store, retrieve and visualize dynamical information. Dynamical data is aggregated over time into a sequence of static snapshots, which capture the relationships between network components in given time ranges. With this approach, we provide a tool to animate network dynamics over time and explore attribute-rich network data. More importantly, “DynNetwork” provides users with centrality indices as a function of time to aid analysis. Finally, we demonstrate the usefulness of the application on samples of dynamic networks.

Visualization THUR.PM1

Temporal Visualization of Dynamic Collaboration Graphs of OSS Software Forks

Amir Azarbakht, Oregon State University

Contact: azarbaam@eecs.oregonstate.edu

In this work, we studied collaboration network of three open source projects using a combined analysis method of temporal visualization and temporal quantitative analysis. We based our study on two papers by [Robles and Gonzalez-Barahona 2012] and [Hanneman and Klamka 2013], and identified three projects that had forked in the recent past. We mined the collaboration data, formed dynamic collaboration graphs, and measured social network analysis metrics over an 18-month period time window. We also visualized the dynamic graph (available online) and as stacked area charts over time. The visualizations and the quantitative results showed the differences among the projects in the three forking reasons of personal differences among the developer teams, technical differences (addition of new functionality) and more community-driven development. The personal differences representative project was identifiable, and so was the date it forked, with a month accuracy. The novelty of the approach was in applying the temporal analysis rather than static analysis, and in the temporal

visualization of community structure. We showed that this approach shed light on the structure of these projects and reveal information that cannot be seen otherwise.

Adolescent Friendship Networks THUR.PM2

Adolescent Friendship Networks THUR.PM2

Person-Centered Religious Influence and Selection in Adolescent Friendships

jimi adams, American University, David Schaefer, Andrea Vest

Contact: jadams@american.edu

This research addresses the intersection of two domains of adolescents' lives that have received considerable recent attention in social science literature. First, sociologists have argued that religion is better understood with a "person-centered" rather than variable(s)-centered approach. Latent class analysis (LCA) provides one strategy for empirically investigating this person-centered approach by identifying how people combine various dimensions of religion into religious profiles. This approach requires substantially more data than is frequently available in surveys where religion is a less focal aspect of the research design. A helpful question for researchers interested in using this framework is therefore whether religious profiles can be estimated from limited measures of religiosity. The first component of this paper asks whether commonly available survey-based measures of religion - particularly those capturing religious identification, importance and participation - can be used to approximate the person-centered approach. Second, advances for statistically modeling friendship data have allowed scholars to distinguish when friends' behavioral and attitudinal similarities derive from processes of interpersonal influence as opposed to homophilous friend selection. Recent evidence relying on more variable-oriented approaches suggests that selection and influence processes are active in the domain of religion. The second question in this paper therefore uses stochastic actor oriented models to ask whether selection and influence processes operate for LCA-based religious profiles. We address these questions using data from two schools from the National Longitudinal Study of Adolescent Health.

Adolescent Friendship Networks THUR.PM2

Adolescents' Perceptions of Friendship and Peer Groups

Seungyoon Lee, Purdue University, Jeremy Foote, Zachary Wittrock, Doran French, Siyu Xu, Li Niu

Contact: seungyoon@purdue.edu

Literature on perceptions of network structure has primarily focused on organizational contexts, examining the link between perception accuracy and variables such as structural

position, power, personality, and workplace performance. The current study extends the study of network perception to adolescents. Adolescents' social cognitive ability has important implications for their social functioning and studies show that children's recall of social relationships is often inaccurate and biased. We focus on examining how perception accuracy is associated with structural positions as well as psychological and behavioral traits. Data on two different types of social relationships were collected from 1,512 seventh- and tenth-grade students in China: friendship ties based on sociometric survey and peer groups based on Social Cognitive Mapping (SCM) questionnaire modules. At the individual level, we examine predictors of adolescents' perception accuracy of peer groups in their grade. Preliminary analysis shows that perception accuracy is positively associated with degree and closeness centrality in friendship network. Further, accurate perception of peer groups one does not belong to was positively related with loneliness. At the group level, we examine the characteristics of groups that predict the salience and accuracy of peer groups as perceived by both members and non-members. Predictions include that group homogeneity and problematic behaviors of members will influence perceptions of peer groups. Implications for understanding the connection between adolescents' social relationships and social cognition are discussed.

Adolescent Friendship Networks THUR.PM2

Group and Crowd Effects on Adolescents' Willingness to Intervene in Bullying Episodes: Results of Multi-Level Regressions

Benjamin Colaiaco, Pardee RAND Graduate School, Harold Green, Joan Tucker, Kayla de la Haye, Michael Pollard, Dorothy Espelage, Matthew Hoover

Contact: colaiaco@prgs.edu

Studies investigating peer influence have found significant relationships between adolescent bullying and peer bullying behaviors and attitudes. In addition, recent reports indicating increases in bullying among adolescents highlight the importance of developing informed, targeted intervention programs to reduce bullying among school-aged children. This study identifies sub-communities of adolescents within three middle schools over five waves of data using edge betweenness and label propagation algorithms to measure the effect the normative behaviors and attitudes of adolescent's sub-community have on his or her willingness to intervene during an episode of bullying. Analyses characterize the differences between sub-communities within each algorithm-school-wave combination based on demographics and predictors of willingness to intervene taken from the literature. We use multi-level regression models to explore the individual, peer group, sub-community, affiliation (i.e., crowd), and school-wide network-level factors that predict an adolescent's willingness to intervene during a bullying episode. We will discuss the results in detail considering their relevance for network-based bullying interventions.

Adolescent Friendship Networks THUR.PM2

Informal Social Network Dynamics and Day-to-Day Variability in Stress

Christopher Browning, The Ohio State University, Jodi Ford

Contact: browning.90@osu.edu

Peer relationships can have a significant impact on adolescent health outcomes. However, prior research has focused primarily on the role of peers in shaping adolescent behavioral and psychosocial health. Few have explored the extent to which the physiological stress processes may result from peer network interactions. We consider whether the structure (peer network density) and composition (risk behavior orientations of peers) of ego networks combine to influence day-to-day informal social network interactions, mood states, and perceptions of the informal social control environment that may influence the stress process. Data are from 31 youth between the ages of 11 and 17 from two communities in a large Midwestern city. Youth were interviewed in home and asked about up to 10 peer network partners with whom they spend time. They were then given a cell phone for one week and texted surveys 5 times daily to capture the presence of peer network partners, mood states, and perceptions of whether rules are enforced in the immediate setting. Each night, youth provided a saliva sample to capture nighttime variability in cortisol levels. Multilevel models of daily stress measures nested within persons offer preliminary evidence that informal network dynamics influence the likelihood that youth will report that they are in a setting where rules are not enforced. The latter, in turn, is positively associated with cortisol, indicating that that network dynamics are associated with time spent in unstructured peer network settings, increasing levels of stress for urban adolescents – with potentially long-term health implications.

Egocentric Networks THUR.PM2

Egocentric Networks THUR.PM2

Conceptualizing network norms: are injunctive and descriptive norms, elicited from the network of close ties, associated with self-reported behavior and intention for future behavior?

Peter Busse, Instituto de Estudios Peruanos

Contact: peter.busse@gmail.com

Personal networks influence a number of health behaviors (e.g. Latkin et al., 2010). One mechanism for this effect is explained by the mediating role of perceived norms, as networks establish a norm, which is subsequently used by individuals to form decisions to engage in health behaviors. The theoretical tools to examine the influence of perceived norms from the network come from theories of social normative influence such as the Focus Theory of Normative Conduct (FTNC, Cialdini et al., 1990), the Reasoned Action Approach (TPB, Fishbein & Ajzen, 2010), and the Theory of Normative Social Behavior (TNSB, Rimal & Real, 2005). What these theories agree on is that norms are of two types: descriptive norms—or the perceived prevalence of an existing behavior—and injunctive norms—or the perception of whether a given behavior is approved/disapproved by a social referent. These theories, though, do not agree on the social referents that are perceived to exert that influence: under the TPB, “important others” are perceived to influence injunctive norms and “similar others” are perceived to influence descriptive norms. For the TNSB, “peers” are the ones influencing descriptive or injunctive norms. The FTNC rely on different social referents that vary in their level of specificity—e.g. from a household in the neighborhood to a fellow guest in a hotel room—in order to understand the influence of social norms. This paper systematizes the different conceptualizations of norms in the recent social network analysis literature (2000 to 2013) and tests its expectations—that injunctive and descriptive norms elicited from the personal network of close ties are associated with proxies of behavior—with cross-sectional data from adults in the context of the consumption of fruits and vegetables in Peru.

Egocentric Networks THUR.PM2

Opportunities and Limitations for Research Using Call Data Records to Extract Personal Networks

Drew Margolin, Cornell University, Devon Brewer, David Lazer

Contact: dm658@cornell.edu

Increasing attention has been focused on call data records (CDRs) as a source of data for social scientific inquiry. CDRs store information about phone-to-phone or device-to-device contact over phone lines and cellular networks, enabling the assembly of large, inter-connected networks with reach time and frequency detail. The ubiquitous and longstanding presence of telephones in social life makes these data particularly valuable for the study of large populations and their social properties and evolution. Unfortunately, while CDRs present an important opportunity, these data also present unique difficulties stemming from their anonymous nature and the fact that they reflect economic differences, such as access to technology and potentially expensive communication. This paper focuses on specifying the strengths and weaknesses of these data via an empirical analysis drawn from three surveys which indicate who uses phones and how. The data include 2 surveys of nationally representative samples of adults in the USA and Spain (n=1000) that and a study of mobile phone communication in the hours after the Boston Marathon bombings (n = 149).

Egocentric Networks THUR.PM2

Peer Networks and Adolescent Substance Use: Comparing Complete and Personal Network Data

Harold Green, RAND Corporation, Matthew Hoover, Joan Tucker, Michael Pollard, Kayla de la Haye, Dorothy Espelage

Contact: hgreen@rand.org

Much of statistical network analysis is based on the assumption that data are collected from complete networks. Ego-centered or personal network approaches are better suited to large-scale studies but it is unknown whether these designs introduce error into parameter estimates or impact statistical models. We present preliminary results from a pilot study comparing complete and ego-centered designs. Complete network information on high school students in an Illinois town was collected in the spring of 2013. Adolescents from 9th through 12th grade reported on a wide range of behaviors and attitudes and provided peer nominations. Approximately three weeks after completing the in-school complete network study, we emailed students to participate in an optional, personal network survey. Preliminary analyses compared

school-based survey data from the complete sample with school-based survey data from those who chose to complete the personal network survey. We find demographic differences that vary by school; we find only a few differences on delinquency, alcohol and drug use, or bullying; and we find differences in some aspects of network position. In each school, personal network respondents seem to be distributed throughout the complete network. We present these findings in greater detail, along with results from analyses that compare networks elicited in the personal network study with those constructed from the complete network study. These analyses also allow investigation of respondent accuracy, as we can compare self-reports of alter substance use with ego reports of those same behaviors. Implications for study design and statistical analysis are discussed.

Egocentric Networks THUR.PM2

Surveying Personal Networks and Social Capital in General Social Surveys: Challenges in cross-cultural perspective

Dominique Joye, Faculty of Social and Political Science University of Lausanne, Christof Wolf, Marlene Sapin

Contact: dominique.joye@unil.ch

The measurement of personal network data in general social surveys is a longstanding challenge. The “ego-centered approach”, describing alters and asking for their interrelations on the base of a “name-generator”, is seen as difficult and a burden for respondents. These problems notwithstanding, egocentered network instruments have been successfully fielded already in the 1980ies, for example in the General Social Surveys of the US. Since then it has also been used successfully in other countries, including the ones of the authors. However, more recent research has shown that if this instrument is administered by an interviewer there is the additional problem that interviewers have an incentive to shortcut the interview by reducing the number of alters. There have been attempts to develop alternative forms of measuring social capital and resources linked to social relations and networks. For example the ISSP of 1985 and 2001 give a relative big importance of social support provided by friends and relatives in different circumstances as well as the intensity of relation with family members. A further alternative has been proposed by Nan Lin and Bonnie Erikson who have advocated the use of a position generator. A related suggestion comes from Van der Gaag and Snijders who developed a resource generator. All three approaches – egocentered networks, social support and position/resource generators -- have strengths and weaknesses. Some of them shows higher fieldworks challenges, others focus more exclusively on resources, some concentrate essentially on strong ties, while others favor who one knows, assuming that it gives access to resources. This paper discusses the pros and cons of these approaches in a cross-national perspective. In particular we attempt to evaluate the cost/benefit ratio of these instruments.

Ethnicity and Networks THUR.PM2

Ethnicity and Networks THUR.PM2

Effects of Resource Competition on Blacks' Whites' and Asians' Spatio-Temporal Interactions

John Tawa, Salve Regina University, Juergen Pfeffer, Fred Morstatter, Rosalyn Negrón

Contact: saitawa@gmail.com

In this presentation we share results from a study in which we used a virtual environment to experimentally test classic sociological theory that suggests that competition for limited resources results in increased social distances between racial groups. Black, Asian, and White participants created self-resembling avatars in the virtual world, Second Life, and interacted in small groups designed to simulate various forms of resource competition. Groups were racially diverse and included approximately 20 avatars that interacted simultaneously. Computer scripts attached to each avatar captured participants' coordinates on the Second Life grid at 1-second time intervals. Coordinate data was used to compute variables to examine spatio-temporal interactions between every pair of nodes and each node in relation to Black, Asian, and White racial groups: average interpersonal distances, duration of interactions, and gravitation/repulsion. We then created an MR-QAP network regression model to demonstrate the importance of these variables for predicting friendship selections. Results are interpreted in relation to the influence of resource competition on racial dynamics.

Ethnicity and Networks THUR.PM2

Examining redundancy of organizational communication networks of a Korean immigrant church

Sunny Lee, University of Oklahoma, Heewon Kim

Contact: sunklee@ou.edu

As an extension of a study examining the effects of organizational communication networks of a Korean immigrant church on its members' intercultural development (Lee, 2013), the current study investigates the differences and similarities among the three kinds of organizational networks (i.e., information, emotional support and tangible help) in their structures and compositions. The earlier study found that those who occupy central positions, operationalized by the Indegree centrality scores, in the information network of the church tended to be more ethnocentric than peripheral actors after controlling for the effect of English proficiency. The current study examines how other types of centrality scores explain the network dynamics in

different types of networks. In addition, the church members' personal communication technology uses (i.e., cellular voice calling, texting, email, and social media) and different types of demographic homophily are considered in analyzing the network dynamics of the immigrant community. The findings of the analyses will be discussed in relation to unique forms of social capital embedded in the Korean immigrant church community. The fact that information network was the most dense network among the three represents that the immigrant church served as a place for its members' information exchange rather than giving each other emotional support or some tangible help. Partially, it could have been originated by the order of questionnaires in the network survey. However, the fact that many alters were redundant across the three networks, but the number of alters were smaller in the latter two networks indicated some notable difference.

Ethnicity and Networks THUR.PM2

Voluntary Association Participation and Immigrants' Socioeconomic Network Advantages in Urban Canada

Jing Shen, The Prentice Institute for Global Population & Economy, University of Lethbridge

Contact: jing.shen@uleth.ca

Using the General Social Survey of Canada – Network Survey (Cycle 22), in this study we examined the association between civic engagement and socioeconomic diversity of immigrants' networks in urban Canada. Existing literature has demonstrated that immigrants' inferior socioeconomic status in the host country can be partially attributed to their disadvantaged social network resources. By focusing on the number of voluntary organization one takes part in and the frequency of one's voluntary activity participation, we found that civic engagement can significantly increase the diversity of one's socioeconomic network, which in turn increases one's opportunity of accessing high-status network resources. In other words, civic engagement can serve as an effective means for immigrants to penetrate their network boundaries by diversifying one's socioeconomic network and providing access to high-status social contacts.

Intra-Organizational Networks THUR.PM2

Intra-Organizational Networks THUR.PM2

Comparing STEM and Social Science Networks of Mentoring using ERGM

Neha Gondal, The Ohio State University, Paul McLean

Contact: gondal.2@osu.edu

The academy works as a complex system comprised of multiple networks operating at multiple levels, encompassing both individuals and organizations (e.g., Burris 2004). This system includes: collaboration networks (e.g., Moody 2004); citation networks (e.g., Evans 2010); epistemic communities drawing on similar literatures (e.g., Gondal 2011); and joint service on the boards of journals, professional organizations, and grant-giving agencies. Not as frequently studied or as readily recalled are faculty activities and involvements within departments, and outside/across departments within universities. Managing successful careers includes multi-level networking: achieving a scholarly reputation, working for influence within the university, building departments, and mentoring promising students. This paper examines one component of this complex structure: the two-mode network of faculty on one hand, and the graduate students working on dissertation projects under their direction on the other. We examine the interlocking network structure of dissertation committees in two R1 university departments—one STEM department and one social science department—from 2000 to 2013. We use descriptive statistics, blockmodelling, and ERGM models to assess the importance of endogenous structural tendencies such as preferential attachment and clustering, and exogenous factors such as faculty rank, scholarly impact, gender, and subspecialty, on the structure and cohesiveness of each department's network. In doing so, we investigate (1) if the social structure of mentoring PhD students differs across the STEM--social science disciplinary divide, and (2) the durability of these structure(s) over time.

Intra-Organizational Networks THUR.PM2

Intra-institutional organization and the ecosystem approach for science and advice: A social network analysis of ICES expert groups

Dorothy Dankel, University of Bergen, Norwegian Institute of Marine Research

Contact: dolly4fish@gmail.com

The International Council for the Exploration of the Sea (ICES) is the world's oldest intergovernmental organization dedicated to marine science. The ICES mission statement is "To

advance the scientific capacity to give advice on human activities affecting, and affected by, marine ecosystems." The ICES Mission calls for an "establishment of effective arrangements to provide scientific advice," and for coordination for "enhancing physical, chemical, biological, and interdisciplinary research." Today around 1600 scientists from 20 member countries are affiliated with and conduct science and formulate advice as part of an overall ICES network that is given its most concrete form in the attendance of expert groups. This study outlines an intra-organizational network analysis, to assess network structures within ICES as an organization. How are these individual scientists organized in the vast landscape of over 220 ICES expert groups and what does this mean for the scientific and advice capacity of ICES as an institution? Based on a questionnaire, we visually and analytically examine the human links between expert groups. The questionnaire results match expert group attendance to types of expertise, both the types that scientists offer and what chairs see that they need, and particularly those they lack. A number of questions relevant to the management of ICES knowledge production can be examined using this data. For example, are there groups that centralize the flow of particular kinds of knowledge? Are there groups that act as knowledge brokers? In addition, we discuss the role of the ICES Council in the development of the ICES Strategic Plan 2014–2018 and the Science Plan 2014–2018 as well as the role of the national delegates in nomination of the experts to the ICES expert groups. The results outlined in this paper give us a picture of how the ICES network is actually working and insight to how it can more effectively give advice in support of an ecosystem approach to marine management.

Intra-Organizational Networks THUR.PM2

Moving Social Network Theory into Organization Design

Christian Waldstrøm, Aarhus University, Kent Jensen

Contact: cwa@asb.dk

A wide range of social network studies has contributed to a more enriched understanding of how informal structures are at times decoupled from formal hierarchical structures, and how informal structures shape organizational behavior and impact organizational performance. However there is a high potential from considering the interplay between formal and informal networks structures in an organization design perspective. While extant contingency theory contain a solid knowledge base of how to design formal structures, informal structures are traditionally viewed as taking on a more emergent character and being less in management control. Recently, however, there has been an increasing attention to how managers by design of formal structures indirectly affect behavior and performance that arise primarily out of informal structures. This view is consistent with several findings in diversity research, which similarly view formal structures as either enhancing or reducing diversity fault lines and thereby affect group and organization performance. In pushing forward a social network theory of organizational design we not only need to be able to locate "fit" and "misfit" situations, we

also need to establish knowledge of how managers can obtain fit by either influencing informal or formal social structures. In this theoretical paper, we present four models for explaining how research in this field could progress – each dependent on different assumptions of causality and interactions between informal networks, formal structures and behavior/performance.

Intra-Organizational Networks THUR.PM2

Project Networks and Advice Seeking in Corporate R&D – A Multilevel Investigation

Julia Brennecke, Department of Business Administration Albert-Ludwigs-Universität Freiburg,
Olaf Rank

Contact: julia.brennecke@vwl.uni-freiburg.de

We investigate interdependencies between employees' memberships in multiple R&D-projects and their informal advice ties with colleagues within and outside of their projects. Building on the assumption that individuals' informal networking behavior interacts with their embeddedness in the project membership network, we concentrate on the following questions: Do multiple project memberships lead to individuals being especially sought-after as advisors? Do individuals spanning boundaries by being members of multiple projects rely less on informal advice seeking to gather knowledge? To answer these questions, we apply multilevel exponential random graph models (ERGMs) to data covering the entire R&D-department of a multinational corporation headquartered in Germany. We find that affiliation-based popularity and activity effects play an important role for the overall structure of the multilevel network. Our results highlight that individuals spanning boundaries in project organizations – either by their multiple project memberships or by their advice-seeking behavior – play a major role with respect to the dissemination of knowledge. Their existence is therefore critical for the functioning of the overall project organization. Apart from adding a multilevel perspective to research on project management and knowledge exchange, our study contributes to the field of multilevel network modeling by providing an application of multilevel ERGMs that explicitly treats within-level and between-level structure as endogenous.

Natural Resource Management Networks THUR.PM2

Natural Resource Management Networks THUR.PM2

The roles of tie strength and network diversity in community ecotourism. Who gets empowered?

Ana Elia Ramon Hidalgo, University of British Columbia

Contact: anaelia@interchange.ubc.ca

Community-based natural resources initiatives, such as community ecotourism, specifically designed to reconcile wildlife and habitat conservation with community empowerment, have been criticized for recurrently failing to deliver on their promises. Considering that a) the extent to which social capital is available to members of a community will partly determine their empowerment, b) these community initiatives tend to operate through far more informal processes than larger businesses and c) such initiatives are highly dependent on the personal dynamics of the individuals involved, I studied the role that ego-networks play in the success of community ecotourism at empowering residents. More specifically, drawing upon survey data from two ecotourism cases in the Volta Region of Ghana, I used diversity and strength of ties to investigate the correlation between structural social capital and individual empowerment outcomes. Additionally, since communities are not homogeneous, I explored the degree to which ego-networks and empowerment outcomes differed between genders in the communities under study. Results from this study have potential implications for understanding both the relationship between ego-networks and empowerment, as well as for community ecotourism management planning.

Natural Resource Management Networks THUR.PM2

The role of ethnic diversity and individual stakeholder attributes on social network capital in a social-ecological system

Michele Barnes-Mauthe, Department of Natural Resources and Environmental Management, University of Hawaii, Steven Gray, Shawn Arita, John Lynham, PingSun Leung

Contact: barnesm@hawaii.edu

Social-ecological systems are commonly characterized by diverse sets of stakeholders embedded in social networks. By sharing information and building relationships with various stakeholders, resource users can accrue social network capital – an asset that can provide social and economic advantages to those that are better, or strategically, connected. Yet little is known

concerning who is more prone to share information and occupy advantageous network positions in social-ecological systems, thereby achieving greater levels of social network capital. Using a comprehensive information sharing social network dataset on Hawaii's longline fishery, we first identify appropriate measures of social network capital. We then employ social network analysis, general linear models and other statistical tools to construct these measures and determine the extent to which ethnic affiliation and other individual attributes can explain variation within them. We find that ethnicity most strongly correlates with the majority of social network capital measures and is a significant predictor of their variation. Activity in local fishing organizations, information sharing attitudes and measures of human capital, such as title/tenure and experience, are also important predictors; though results vary depending on the measure of social network capital employed. To shed light on the structural relationship of social network capital including both direct and indirect effects, we test a post hoc path model on eigenvector centrality, which previous research has identified as a key network measure for information access and diffusion. Our results offer insight on stakeholder diversity, information sharing and agency in social-ecological systems, and have important implications for resource governance.

Network Dynamics THUR.PM2

Network Dynamics THUR.PM2

“Don’t grab the nucleus!” The role of within- and between- field connectors in the development of a stable core in r&d-networks

Joerg Raab, Tilburg University, The Netherlands, Remco Mannak, Marius Meeus, Alexander Smit, Terry Amburgey

Contact: j.raab@uvt.nl

Organizations increasingly rely on R&D-partnering in networks of mutually connected inter-organizational projects in order to keep up with today’s volatile markets and rapidly changing technologies (Bakker, Boros, Kenis, & Oerlemans, 2012). Despite the (rhetorical) emphasis on flexibility in research and practice, we argue that firms also actively look for stability through repeated collaboration in R&D-consortia over time which has major consequences for the evolution of the network structure. Organizations that repeatedly collaborate with the same partners in successive projects and extend the duration of their relations can create a stable core in the network. We therefore analyze the dual relation between actions of structurally differentiated actors and network dynamics (Ahuja, Soda, & Zaheer, 2012). We in particular investigate the question to what extent the development of a stable core in the R&D-network is related to repeated collaboration of within- and between-field connectors. We explore the network dynamics of 104 R&D-consortia in the Dutch water sector over 24 years, as well as the repeated collaboration of 318 network members (individual project leaders and industry partners). Results show that the evolution and disintegration of a stable core in the network is related to the presence of repeatedly collaborating between-field connectors and their connectedness to the flexible shell of peripheral actors.

Network Dynamics THUR.PM2

Dynamic agenda-convergence networks: Predictors of homogeneity in news content across outlets and sectors

Katherine Ognyanova, <p>Northeastern University</p>

Contact: insna@ognyanova.net

This work proposes a relational approach to the study of news agendas in a digital age. It employs a broad analytical strategy exploring the media system as a dynamic multilevel, multidimensional network. News providers are viewed as a system of inter-related sources,

connected through patterns of shared content, but also linked by economic, political, and organizational ties. Modeling a segment of that system over time, the study evaluates a range of factors driving topic selection in media organizations. The analysis uncovers network effects and reveals the impact of ownership, media format, market forces and political ideology as predictors of content similarity across sources. The study sample contains U.S. news outlets from five industry sectors: newspapers, online sources, radio, cable and network TV stations. The dynamics of agenda convergence are found to be shaped by preferential attachment to popular outlets and driven by similarities in format, audience demographics, and political ideology. Audience size does not significantly influence the correspondence in news source agendas over time. The analysis also shows that co-ownership relations lead to lower agenda convergence for the outlets in the sample.

Network Dynamics THUR.PM2

Social Dynamics of Selection and Influence: Implications for Group Formation and Structural Leverage

Ran Xu, Michigan State University, Ken Frank

Contact: ranxu@msu.edu

In this study we use agent-based modeling to study dynamics of a social system, which consists of the processes of how actors influence one another and select with whom to interact. We make a distinction between influence through norms based on actors' mean attributes, and influence through pieces of information that circulate through the system. We argue although actors' influence and selection behavior are two distinct processes, they are driven by two same factors: efficacy and homophily. Within the selection process actors may be motivated by the value of information (efficacy) as well as the value of similar behavior (homophily). As a complement, within the influence process actors may be persuaded by access to information (efficacy) or by pressure to conform to the norms of the group (homophily). Using these processes we first simulate group formation in dynamic networks. We show that unlike the inevitable group polarization as shown in other literatures, we can represent a system in which the dynamics do not inevitably lead to the separation of the actors into disconnected subgroups by incorporating the pursuit of information into the theory. Second we simulate different actors capacities for influencing the behavior of the whole system. We define this as structural leverage, which is actor's capacity to influence the behavior of the others in this dynamic system. We show how this concept differs and can contribute to the traditional centrality measure.

Network Dynamics THUR.PM2

Dynamic Longitudinal Social Network Analysis: Determining the Effectiveness of a Knowledge Broker

Rebecca Clunn, Commonwealth Scientific and Industrial Research Organisation | CSIRO
, Anne-Maree Dowd, Christopher Cvitanovic, Mark Howden, Craig James

Contact: Rebecca.Clunn@csiro.au

In recent years, with the emergence of more integrated, complex projects that bring together researcher, sectoral stakeholder and policymaker input, the role of knowledge brokers has become central to the success of many collaborative projects. While the role and function of knowledge brokers are conceptualised and operationalised differently in various sectors and settings, the common feature of such a role is to facilitate the exchange of knowledge among a network of various stakeholders, including researchers, practitioners, and policy makers. The effectiveness of knowledge exchange across such networks can be assessed using social network analysis (SNA), which illustrates the network shape and structures that perform more effectively in given situations. SNA is therefore an appropriate tool to explore the efficacy of a knowledge broker. This paper presents a novel longitudinal cross-sectional case study approach to analyse the dynamic and growing network of a knowledge broker within a science research organisation. Multiple ego networks from both the knowledge broker and identified network members are compiled and examined over a twelve-month period. We use network structure as a framework to determine and verify network efficacy of the knowledge broker and to identify potential areas for network development. This procedure may have benefits in showing the impact of knowledge brokers within their own operational contexts and further may have implications for bridgers and boundary spanners in other sectors.

Network Mechanisms and Network Evolution THUR.PM2

Network Mechanisms and Network Evolution THUR.PM2

Hate Networks in the United States

John Schnell, University of Alabama in Huntsville, Cynthia Gramm

Contact: schnellj@uah.edu

We investigate the network of “hate groups” in the United States using maps and data supplied by the Southern Poverty Law Center (SPLC) in Montgomery, Alabama. The SPLC is a nonprofit civil rights organization. Internationally known, it was founded by civil rights lawyers Morris Dees and Joseph Levin Jr. in 1971. The SPLC states on its website (splcenter.org) that it is “known for tracking and exposing the activities of hate group.” Such groups may collaborate through area-based terrorist networks. Three states in the Deep South, for example Alabama, Georgia, and Mississippi, have, respectively 30, 52, and 36 hate groups. In Alabama, one can find “Neo-Nazi,” “Neo –Confederate,” “White Nationalist,” as well as “Black Separatist” groups, and of course the “KKK.” But there are also 109 hate groups spread almost evenly throughout New York, Ohio, and Pennsylvania, which contains the hometown of one of the authors. The “City of Brotherly Love,” plays host to “The Hated” (“skinheads”). We use standard network statistics to determine inter- and intrastate, as well as over-time, linkages and measures.

Network Mechanisms and Network Evolution THUR.PM2

The Compartmental Evolution of Social Support

Mario Small, University of Chicago, Vontrese Deeds, Peter McMahan

Contact: mariosmall@uchicago.edu

Studies of social support have suggested that people tend to turn to different alters for different kinds of support, a practice researchers have referred to as differentiation or compartmentalization (Wellman 1990, Bearman and Parigi 2004, Small 2009). However, most empirical studies have addressed this question based on cross-sectional data, implicitly conceiving of compartmentalization as a static phenomenon, rather than a dynamic process. In what follows, we examine the evolution of compartmentalization based on qualitative and quantitative data on a group of first-year graduate students followed over the course of their

first year. We focus specifically on who respondents turn to when discussing sensitive matters, and conceptualize compartmentalization as involving two separate components: the extent to which, for a given topic, ego turns to some alters more than others; and the extent to which, for a given alter, ego confides with respect to some topics more than others. Based on differing assumptions about how people make decisions about confiding in others and how much intimacy people are comfortable with, we derive hypotheses about the evolution of compartmentalization over time. Combining qualitative analyses of interview data with ERGM-based quantitative methods, we find that, while there are moderate amounts of both types of compartmentalization when students first meet and they differentiate more across alters than across topics over time, such that ego trusts fewer alters with more topics. We develop the implications of these findings and propose ideas for future research on the evolution of social support.

Network Mechanisms and Network Evolution THUR.PM2

The Emergence of Organization in Open Productions Through the Analysis of Relational, Real-time Event Sequences

Guido Conaldi, <p>Centre for Business Network Analysis, University of Greenwich</p>, Duy Quang Vu, Alessandro Lomi, Marco Tonellato

Contact: g.conaldi@greenwich.ac.uk

The study examines the micro-structural dynamics of interdependent acts of problem solving observed over the full history of a Free/Open Source Software project. The study documents how organizational properties can emerge and be sustained in open economic productions under conditions of extreme decentralization ("unsegmented decision structures") and dynamic capacity constraints ("fluid participation"). A new class of stochastic models is derived for the analysis of self-organizing relational, real-time event sequences involving two sets of actors. These models promise to bridge the gap between large and complex sets of empirical data on organizational problem solving, and the theoretical view of organizations as complex adaptive social systems.

Network Mechanisms and Network Evolution THUR.PM2

The Shapes of Solidarity: A Formal Network Theory of Community and Society

Matthew Chandler, <p>University of Notre Dame</p>, Omar Lizardo

Contact: chandler.20@nd.edu

There is a long tradition in social network analysis that attempts to formalize the concept of social solidarity using network imagery (e.g. Doreian and Fararo 1998). These modelling efforts remain limited to using graph-theoretic connectivity criteria as the main solidarity metric, with the fully connected clique as the ideal solidary structure. Because this modelling approach collapses solidarity to connectivity it is not capable of distinguishing different types of solidarity in social networks as was the ambition of classical sociology theorists. In this paper we develop a new way to formalize distinct types of solidarity in social networks. Drawing on recent work on the geometry of polyhedra, we conceptualize solidarity as an emergent property of social networks in the third dimension, where the tendency for triadic closure in bonding relations points to the tetrahedron as the ideal-typical shape of "mechanical" solidarity (community), while the tendency for triadic openness in bridging relations points to the cube as the ideal-typical shape of "organic" solidarity (society). The growth of mechanical solidarity is conceptualized as the clustering of tetrahedra, which produces a variety of non-space-filling simplicial complexes--or, if the geometrical regularity of the tetrahedra is relaxed, larger convex polyhedra with central vertices. The growth of organic solidarity, by contrast, is conceptualized as the tessellation of cubes, which produces cubic lattices of varying sizes and shapes. Both types of solidarity can be measured at the group level by the number of concatenated ideal-typical units and by the proportion of volume filled by the intersection of circumspheres of concatenated units. We use simulations to illustrate the typical growth patterns of each distinct ideal-typical form of solidarity, including how clusters of tetrahedra can evolve into tessellations of cubes, and how both can overlap to produce a variety of complex patterns of network structure and dynamics. The paper concludes with suggested avenues for future empirical and computational research to test and refine the theory.

Networks and Teams THUR.PM2

Networks and Teams THUR.PM2

Does Conflict Network Centrality Drive Perceptions of Intragroup Conflict?

Anthony Hood, COLLAT School of Business, University of Alabama at Birmingham

Contact: ahood63@uab.edu

Although much research attention has focused on group members' perceptions of conflict in the aggregate (i.e. intragroup conflict), less attention has been paid to conflict perceptions at the individual and dyadic levels. The current investigation attempts to aid in this regard by exploring variation in a group member's reports of conflict based on differences in the referent of conflict (Chan, 1998). Specifically, I explore the extent to which a group member's perception of intragroup conflict is driven by their direct and indirect involvement in conflict. I consider direct involvement in conflict to be reflective of a group member's centrality (in-degree and out-degree) in a group's conflict network. Indirect involvement in conflict refers to conflicts occurring between a group member's teammates (i.e. alter-alter conflict). I propose that a member's perceptions of group-referent conflict may be driven by a complex combination of different manifestations of member-referent conflict perceptions. Consideration of ego conflicts and alter-alter conflicts, both separately and collectively, may provide an important complement to traditional (Jehn, 1995) and emerging perspectives in the conflict literature including conflict asymmetry (Jehn et al., 2010), conflict involvement (Jehn et al., 2013) and the co-occurrence of multiple types of conflict (de Wit et al., 2011).

Networks and Teams THUR.PM2

Interdisciplinary Design Teams: Self-Organization and Performance

Amy Wax, Georgia Institute of Technology, Kathryn Dalrymple, Leslie DeChurch, Bruce Walker, Noshir Contractor

Contact: amymwax@gmail.com

Individuals face a dilemma when working on interdisciplinary teams. Whereas people are innately attracted to those who are similar and familiar, the interdisciplinary nature of design work benefits from variety, requiring individuals to work with those who are different and unfamiliar. Findings from 93 individuals who self-organized into and then worked on one of 25 HCI design teams illustrate how individuals assemble into design teams using homophily and propinquity rules, and the performance implications of said patterning of team-self assembly.

Furthermore, the current paper illustrates two new ways of utilizing ERGM/p* analyses to study team self-assembly. Preliminary findings support the basic premise that individuals self-organize following rules that promote the reduction of uncertainty – teaming up with similar others with whom they have prior ties. However, more creative teams forgo the familiarity rule and join forces with new faces.

Networks and Teams THUR.PM2

Just the facts: Does moderate emotionality predict team performance?

Molly McKean, Cincinnati Children's Hospital Medical Center, Shannon Provost, Sunny Thakkar, Francesca Grippa, Peter Gloor

Contact: molly.mckean@cchmc.org

While increasing prevalence of social network analysis (SNA) tools and methods has allowed for an enhanced understanding of communication patterns within and across virtual groups, passive collection of ego network data through email archives is a relatively unexplored methodological strategy. Most previous SNA research draws on self-reported data on the nature and intensity of relationships. We study creative teams in a complex design project developing innovations to improve outcomes for children and adolescents with chronic diseases through longitudinal analysis of primary email communication data. We examine both social network structures and levels of sentiment in the e-mails' content. We find that as teams mature over time, positive sentiment in the content of their email messages declines. Are teams doing better and feeling worse? We explore two hypotheses: as focal design projects advance, an increase in stress (perhaps reflecting looming deadlines and waning budgets) impacts emotionality. Alternatively, as collaboration evolves, there is less need for disproportionate positive language that helps to grow trust in early project phases. As team members get to know each other, they can “cut through the chaff,” and “stick to the facts”, converging on the 3:1 ratio of positivity to negativity first identified by Losada, a divide distinguishing normal and flourishing team performance.

Networks and Teams THUR.PM2

Seeing yourself as more central and your team as better performing: How asymmetric perceptions undermine team performance

Jonathon Cummings, Duke University, Esther Sackett

Contact: jonathon.cummings@duke.edu

Drawing from literature on teams and social networks, we examine the antecedents and consequences of asymmetric perceptions -- the extent to which team members differ in their perceptions of team processes and outcomes. For example, some members may see themselves as more central in the task interdependence network than other members see them. While asymmetric perceptions have been shown to impact team outcomes in an emerging body of research, the multilevel effects of these asymmetries remain unexplored for many team constructs. Using field data from 2,193 members across 311 teams in a large corporation, we test hypotheses from a multi-level model of asymmetric perceptions and team performance. At the member level of analysis, we first focus on two personal attributes (leader role and time allocation) and two relational attributes (tie duration and physical proximity) as antecedents of task interdependence centrality. We then examine how these four attributes as well as centrality impact task interdependence asymmetry and team performance asymmetry. At the team level of analysis, we analyze whether variation in task interdependence asymmetry and team performance asymmetry have consequences for executive-rated team performance. We find support for most of our hypotheses. In general, members who are team leaders, allocate more time to the team, have known other members longer, and are more physically proximate are (a) more central, (b) exhibit less task interdependence asymmetry, and (c) exhibit more task performance asymmetry. Furthermore, teams with greater variation in task interdependence asymmetry and team performance asymmetry have lower executive-rated team performance.

Archaeological Networks FRI.AM1

Archaeological Networks FRI.AM1

Networks and ethnicities in early Italy

Emma Blake, University of Arizona

Contact: ecblake@email.arizona.edu

This study uses social network analysis as a means of community detection in Bronze Age Italy. The Roman conquest of Italy in the fifth to third centuries BCE was made easier by the disunity of the peninsula's inhabitants, divided into myriad autonomous groups who failed to mount an effective unified resistance. A critical research question in Italian archaeology is, when did these regional groups emerge? If one goes back in time far enough, to the Bronze Age, Italy looks very homogeneous, and the current trend in the scholarship is to push this process of group formation quite late, to just before the Roman conquest. I argue instead that the process began much earlier, in the Late Bronze Age, 1350-1000 BCE. I use the co-presence of exotica at proximate sites to posit ties of interaction and thereby construct previously undetected regional networks in Italy. In several cases these regional networks map onto the territories of the later regional groups, and I argue that the Bronze Age networks are the precursors of the regional groups the Romans encountered. I assess the structure of the networks and posit that the character of these early networks is a predictor of later ethnicity formation, through a form of path dependence that endured for many centuries. Thus dense and cohesive networks such as the one in west central Italy precede the emergence of well defined ethnic groups, whereas weak, disconnected networks preceded unstable, poorly defined groups in the same area centuries later, as in Apulia.

Archaeological Networks FRI.AM1

Sociopolitical networks and the transmission of ritual practices in Classic Maya society

Jessica Munson, Simon Fraser University

Contact: jmunson@sfu.ca

Evidence of past human interaction and the transmission of cultural information are not easily extracted from material objects recovered in the archaeological record. Even ancient texts and ethnohistoric documents are limited in their ability to convey information about cultural processes and past social relations beyond their historical content. Yet archaeologists of diverse theoretical persuasions are increasingly applying relational metaphors and network techniques

to examine multiple dimensions of past human interaction. This paper demonstrates how the formal application of social network analyses can be productively applied to a unique dataset of Classic Maya hieroglyphic texts (ca. 250-900 CE). I report a study that investigates the longitudinal dynamics of sociopolitical interactions between Maya royal courts and evaluate how dynastic bloodletting rituals spread along these political networks. Methods derived from social network analysis are used to examine temporal changes in the centralization of political power through different network relations. These network connections provide a further basis for evaluating the distribution of important rites of passage for Maya royalty. Testing the concept of homophily, social network ties between sites identify potential transmission pathways of these bloodletting rituals in Classic Maya society. Results of this case study illustrate how social network analysis techniques can contribute to archaeological studies of the scalar dynamics and organizational changes of past social and political systems.

Archaeological Networks FRI.AM1

Investigating cultural transmission among historic New England gravestone carvers with social network analysis

Jonathan Scholnick, Simon Fraser University

Contact: jscholni@sfu.ca

Human adaptation depends on cultural knowledge that is acquired through social learning. Yet there is much variation in the cultural information within and among groups of people. Evolutionary theorists have developed a set of models that describe social learning strategies, and outline when alternatives can provide more accurate information. However, there are few empirical cases that can be used to trace the transmission of cultural information through a social network over multiple generations. This study uses social network analysis techniques and gravestone decoration to model social learning pathways among gravestone carvers working in the Boston area during the seventeenth and eighteenth centuries. Surprisingly, the analysis reveals that processes of social learning differed at macro (motif) and micro (decorative element) levels of stylistic variation. Gravestones securely attributed to carvers exhibited very little decorative variation in motifs, which suggests widespread transmission among workshops. In contrast, individual stylistic elements are shared by carvers in the same workshop—a pattern that is consistent with the transmission of groups of traits within workshops. The results reveal the ways that the social learning strategies of carvers and the structure of the information transmitted along social network ties structure the cultural information within cultural groups.

Archaeological Networks FRI.AM1

Procurement and distribution of obsidian in prehispanic Mesoamerica, 900 BC – AD 1520: an economic network analysis

Mark Golitko, Field Museum of Natural History

Contact: mgolitko@fieldmuseum.org

Ancient economies have been characterized by many researchers as localized, highly controlled by political actors, and static over long periods of time. In Mesoamerica, recent research has cast doubt on these views, with the recognition of early market place exchange, the production of household surpluses for exchange, and wide-ranging integration into regional trade networks. Here, we expand on an earlier network analysis of obsidian assemblages from the Maya region during the Classic and Postclassic periods to incorporate data for all of Mesoamerica between 900 BC and AD 1520. Using both visual graphical representations and formal network metrics, we find that the Mesoamerican economy was a dynamic and non-hierarchical system, the topology of which underwent significant changes over time. In particular, trends towards decreasing network hierarchy and size culminated in the highly commercialized “international” economy of Late Postclassic period noted in other studies. Through network analysis, we present the ancient Mesoamerican economy as an important case study that contradicts static “top-down” models of ancient economies.

Archaeological Networks FRI.AM1

Sampling Variability in Archaeological Network Measures

John Roberts, Jr., University of Wisconsin-Milwaukee, Ronald Breiger, Matthew Peeples, Barbara Mills

Contact: jmrob@uwm.edu

One common form of archaeological network data is based on the similarity between sites’ artifact assemblages; in this approach, greater similarity between two sites’ assemblages is taken as indicating a stronger tie between those sites. As assemblage data reflect collection effort and other sampling considerations, it is useful to view the assemblages as samples in which observed data, and therefore subsequent calculations such as construction of network measures, include sampling variability. We consider assessments of sampling variability in network measures in this archaeological context, including implications for substantive conclusions. Our analyses use data from the “Southwest Social Networks Project”, focusing on networks constructed from data on decorated ceramic assemblages at late pre-Hispanic sites in the American Southwest.

Event-based networks FRI.AM1

Event-based networks FRI.AM1

A Network Study of the Boston Marathon Bombings Response

Qian Hu, <p>School of Public Administration</p><p>University of Central Florida</p>, Naim Kapucu

Contact: Qian.Hu@ucf.edu

As recent disasters occur, it remains evident that more research is needed to understand how organizations can more effectively coordinate disaster mitigation, preparedness, response, and recovery efforts. Using social network analysis (SNA), this presentation assesses the effectiveness of emergency management plans and frameworks in practice while responding to the Boston Marathon Bombings. This presentation will compare the disaster response and recovery networks embodied in formal preparedness plans with the actual implementation of network response. To address these questions, the formal interorganizational emergency response network detailed in emergency operation plans will be compared with the actual implementation using a network analysis method and tools. Data for this presentation were collected through content analyses of City of Boston Emergency Operations Plan (EOP), newspaper articles (i.e., New York Times, Boston Herald), after action reports, and situation reports (e.g., FEMA, local government and nonprofit organizations involved in disaster response operations). Using UCINET network analysis software program, this study applies SNA to evaluate the success of implementing emergency management plans and identify the gap between emergency management plans and actual implementation. This research provides timely evaluations and recommendations to help better integrate collaborative efforts from multiple organizations in response to disasters. In addition to presenting effective implementation of disaster preparedness plans, this presentation will also address data collection strategies for SNA for disaster networks.

Event-based networks FRI.AM1

Broken and Isolated Bridges from a Disaster: A Longitudinal Study of Interorganizational Emergency Management Networks before and after the 2013 Seoul Floods

Kyujin Jung, University of North Texas, Minsun Song, Richard Feiock

Contact: jkyujin@gmail.com

Widespread interest in studying emergency management networks has tremendously expanded our understanding of interorganizational collaboration, but the dynamic nature of interorganizational networks evolved by a catastrophic event has not been studied from an integrated framework that combines both social network and emergency management perspectives. This research describes changes in organizations playing a bridging role in interorganizational collaboration and examines endogenous and exogenous factors that lead bridges to be broken and nodes to be isolated during a disaster. Building from the Institutional Collective Action (ICA) framework, we argue that organizations playing the bridging role between two other organizations may fail to sustain their ties with them after a catastrophic event. Since the risk and/or uncertainty derived from the bridging strategy is high especially during a disaster, organizations are more likely to forge a direct tie with those who have critical resources they immediately need than rely on pre-existing bridges created before the disaster. Stochastic actor-oriented models for network evolution uncover the dynamics of emergency management networks that evolved from the 2013 Seoul Floods to understand how isolated bridges can be induced by endogenous and exogenous factors of an organization engaged in interorganizational collaborations designed to strengthen community resilience. The preliminary analysis results show that changes to the bridges over time are supported by the level of internal capacities, collaborative leadership, and social vulnerability.

Event-based networks FRI.AM1

Social Connectedness and Mental Health in a Post-disaster context: The case of Bushfires in regional Australia

H Gallagher, Melbourne School of Psychological Sciences, University of Melbourne, Pip Pattison, Dean Lusher, Lisa Gibbs, John Richardson, Karen Block, Elyse Snowdon, Greg Ireton, Louise Harms, Colin MacDougall, Elizabeth Waters

Contact: colin.gallagher@unimelb.edu.au

One of the worst natural disasters in Australia's recent history, the Black Saturday bushfires of February 2009 in the south-eastern state of Victoria caused the loss of 173 lives, widespread property destruction, and has led to ongoing community disruption. This paper on the Beyond

Bushfires project examines the connection of community members to local organisations to understand the factors that influence individual and community in the medium to long-term recovery from these bushfires. Network data for this project (N = 1,057 adults) constitute the examination of multiple communities of varying degrees of bushfire impact. This paper details and discusses the implications of structures of network involvement with mental health, and this presentation will focus on a severely impacted community and the network involving individual participation in local organizations. This focus on community engagement contributes to a greater understanding of the role of social capital on health in post-disaster contexts. Using bipartite exponential random graph models (ERGMs), our results indicate that the non-fire related demographics are implicated in community organisation participation, in line with previous research. However, significantly we find that certain fire-related factors are also important to whether people participate in community organisations, and that these may have important effects on individual and community medium to long-term recovery.

Event-based networks FRI.AM1

The Evolution of Interorganizational Emergency Management Networks: A Test of Bonding and Bridging Effects

Kyujin Jung, University of North Texas, Hyung Jung Park

Contact: jkyujin@gmail.com

Following the 2012 Korean typhoons, this research aims to examine the evolution of interorganizational networks emerged from the Southeastern region of Korean Peninsula, which consists of Busan and Ulsan Metropolitan Cities, and the South Kyeongsang Province. This research was conducted at the organization level to explain how the typhoons change joint coordination efforts contributing to community resiliency. Particularly, this research utilizes four community resiliency indicators: robustness, rapidity, resourcefulness, and redundancy. Given the importance of community resiliency, the research is intentionally designed to test two general hypotheses: bonding and bridging effects. While the former illustrates the importance of trust and information redundancy to coordinate and align emergency preparedness and response, the latter captures the tendency for local actors to seek dominant partners in order to bridge crucial information across the region. A structured survey instrument to 159 organizations was administered in order to compare interorganizational networks that emerge before and after the disasters. The analysis results provide two general implications to understand the evolution of interorganizational emergency management networks. First, interorganizational collaboration for enhancing community resiliency proposes the importance of bilateral aids rather than unilateral. That is, self-organizing emergency management networks are more likely to consist of reciprocal collaboration that enhance community resiliency. Second, direct collaborative ties with other organizations generate structural benefits derived from close-knit networks. Formulating a clustered structure in efforts to enhance

community resiliency not only provides associational benefits such as reputation, knowledge, and institutional norms.

Event-based networks FRI.AM1

Understanding Agency Dynamics of Civil Society Emergence: A Network Analysis of Communication and Collaboration Behavioral Responses after 2008 Wenchuan Earthquake in China

Jia Lu, University of Southern California

Contact: jlu1@usc.edu

In this study, I examine a self-initiating and self-evolving change process of civil society after the 2008 Wenchuan earthquake in China. Using network data from 70 Sichuan-based earthquake recovery-oriented social groups and NGOs, I developed longitudinal network models in discovering the rules that governed the dynamic network behavior over the specified three periods of time: before the 2008 Earthquake, immediately and short-term after the Earthquake, and long-term (up to three years) recovery period. I utilized the SIENA program implemented in the R statistical system to longitudinally investigate: 1) Whether the institutional status in terms of actor registration had an effect on communication and collaboration behavior; 2) Whether there were structural tendencies that would affect the specific formation patterns of the communication and collaboration network development; 3) Whether the types of recovery activities that actors engaged in had an effect on the structural dynamics of the two types of networks; 4) Whether there were tendencies for the cross-mediation between communication and collaboration structures that facilitated the creation and maintenance of the two types of networks. The findings demonstrated the formation of a type of proactive coping style through which newly emerged group and organizational actors took the primary role in overcoming their differences in institutional status and in re-constructing a social structural environment that nurtured the long term social capacity in dealing with extreme distress or uncertainty. The inter-group/organization coping and adaptation behavior self-generated a kind of change that prompted its own structural evolution, thus showing signs of endurance and transformation.

Knowledge and Learning Networks FRI.AM1

Knowledge and Learning Networks FRI.AM1

Skill specialization and the formation of collaboration networks

Katharine Anderson, Carnegie Mellon University, Tepper School of Business

Contact: andersok@andrew.cmu.edu

In recent years, there has been increased interest among funding organizations and administrators in supporting the acquisition of interdisciplinary skills in collaborative communities, such as universities, national labs, and knowledge-based firms. However, there has been relatively little work exploring the effects of interdisciplinarity on the structure and function of these communities. Using a formal model of the collaborative process, I examine the effects of increased interdisciplinarity on the structure of this collaboration network. I show that when collaborative communities become more interdisciplinary, the links in the network become more concentrated among a few, high-degree individuals, and superstars emerge. These individuals, who are so productive that their contributions dominate the overall community, are a potential unintended consequence of policies intended to increase interdisciplinarity. I then define a specialist to be an individual whose skills cluster in a single area, and a generalist to be an individual whose skills span several areas, and I examine the roles that specialists and generalist play in the network. I show that while specialists have more links in the collaboration network, generalists are more likely to bridge between different communities. Given that individuals in these communities tend to benefit from being highly connected, while the community as a whole benefits from bridging activities, this result suggests that generalists may be undersupplied, which lends support to policies that fund the acquisition of interdisciplinary skills in situations where bridging activities are valued by the community at large but are not individually rational.

Knowledge and Learning Networks FRI.AM1

Discursive Participation: Social Network Analysis of Ties that “Glue” Together

Amit Chauhan, Florida State University

Contact: ac11ak@MY.FSU.EDU

Earl Woodruff (1999) discusses four “glue factors” as the basis of interaction and group cohesion in collaborative learning. These glue factors have been identified as function; identity; discursive participation; and shared values. Discursive participation helps to achieve the goals

of the community by advancing the discussion and is an indicator of the levels of participation in a group based on the total number of interactions. This paper explores one of these glue factors and aims to answer the research question – How does student preference for discussion partners relate to discursive participation? This paper uses Social Network Analysis (SNA) to analyze the interaction patterns among students using course blogs and in course discussion forums during a six week online course at a large research university. The participants were approximately 25 graduate students. The participants were required to post a minimum of 4 blog entries per week on the use and application of Web 2.0 tools in instruction and learning. The participants had the choice to interact with their classmates through a responsive dialogue by replying to either 4-6 weekly instructor discussion prompts on the forum or leaving comments on their weekly blog entries. The participants were required to maintain weekly Participation Logs to document their participation. Findings from the study can be helpful to instructors in designing online courses to foster learner participation and engagement using social media tools and technology.

Knowledge and Learning Networks FRI.AM1

Music Learning Networks: Supporting the Music Learning of Adolescents

Tavis Linsin, University of Washington

Contact: tlinsin@uw.edu

Research has established multiple intrinsic and instrumental—social, emotional, cognitive—benefits of learning in and through music. Research demonstrates that access to, and participation in, quality music learning opportunities, particularly for low-income or otherwise marginalized students, is a pressing national challenge. To better understand how students learn music that is of personal significance to them, and to better support them, I investigate which people (teachers, peers, and others), settings (formal and informal), and resources, are most helpful for adolescent music learners in achieving their musical goals. Using a multi-phase mixed-methods design I investigate three hypotheses: 1) Students with richer connections to people, settings, and resources in a music learning network exhibit more positive learning outcomes on average than students without these connections, 2) Students whose interests, motivations, and goals are aligned with the resources available to them in their learning network exhibit more positive music learning outcomes than students whose interests and motivations are out of alignment with resources available to them, and 3) The music learning networks of low-SES students are, on average, less supportive than those of high-SES students. Through descriptive and inferential social network analysis, regression modeling, and qualitative data analysis, I link features of students' individual learning networks, aspects of their position in an aggregate network, and other key covariates to music-focused outcomes: self-assessments, peer-assessments, and expert-assessments. I explore if and how patterns of

cultural participation and learning outcomes vary by race/ethnicity and SES. Findings will inform music education and offer theoretical and methodological advances.

Knowledge and Learning Networks FRI.AM1

It Is Not All About Networking: The Value of “Clicking” in Job Search

Elena Obukhova, McGill University

Contact: elena.obukhova@mcgill.ca

While practitioners and pundits argue that networking is key to finding a job, existing studies of job-search focus on embedded ties and have little to say about networking ties. More importantly, existing literature suggest reasons to doubt networking ties will benefit a job-seeker. The first contribution of this paper is to provide evidence on the effectiveness of networking ties in the job-search context. The second contribution is to develop and test the idea that job-seekers might benefit from networking ties, if the job-seeker and a current employee develop affect during their short interaction or “click”. The empirical context of our study is the search for internships among full-time Master of Business Administration (MBA) students at an elite private university. Our results suggest that job-seekers benefit from networking ties to current employees in the hiring organization, but only if they “click.” We conclude with a discussion about the implications for our study for an understanding of job search and the durability of social network advantage.

Missing Data FRI.AM1

Missing Data FRI.AM1

Bayesian analysis of patchy covert networks

johan koskinen, University of Manchester, Rachel Stevenson, Gemma Edwards, Kathryn Oliver, Chiara Broccatelli, Garry Robins

Contact: johan.koskinen@manchester.ac.uk

Arguably most networks may be construed as a collection of multiple types of nodes interconnected by multiple types of ties. This conceptualization appears particularly useful for studying covert networks. A network may be covert because the individuals may themselves be covert or because some of their ties are covert. The aims and goals of the network also define a covert dimension. The aims and goals may be represented by individual tasks – such as criminals involved in petty crime – or collective tasks and aims – such as furthering the interests of a criminal organization or acts of terrorism. The multilevel conceptualization means that we may sample both on individuals and organisations, events, etc, and trace the rest of the network following different types of ties to other nodes. A multilevel snowball sampling scheme will give us a patchy view of the covert network where the nodes and ties are only partially observed. With the advent of multilevel exponential random graph models we may employ Bayesian data augmentation techniques to account for the fact that we have not completely observed the network. By nature of the network being covert we do however expect that some links and nodes may resist observation more than others. We explore the possibilities for accounting for these observational biases and discuss the role of the covert network's embeddedness in non-covert networks.

Missing Data FRI.AM1

Retrospective Network Imputation from Life History Data: the Impact of Designs

Yue Yu, University of California, Irvine - Networks, Computation, and Social Dynamics Laboratory, Emily Smith, Carter Butts

Contact: ece.y.yu@gmail.com

Retrospective life history designs are one of the few practical methods for collecting longitudinal network information from large populations, particularly in the context of sexual partnership networks. While all such designs afford the ability to "peer into the past" vis a vis the point of data collection, little is known about the impact of the specific design parameters

on the time horizon over which such information is useful. In this work, we investigate the effect of two different survey designs on retrospective network imputation: (1) Last K, where subjects are asked to provide information about their K most recent partners; and (2) Interval N, where subjects are asked to provide information on all partners within the last N time units. We simulate a "ground truth" sexual partnership network using a published model of Krivitsky et al., and subsequently sample this data using the two retrospective designs under various choices of K and N. We examine the accumulation of missingness as a function of time prior to interview, and investigate the impact of this missing data on model-based imputation of the state of the network at prior time points via conditional ERGM prediction. We show that - even settings aside problems of alter identification and informant accuracy - choice of survey design has a large impact on the quality of network imputation, including important effects on properties related to disease transmission.

Missing Data FRI.AM1

Social network applied to risk analytics

Momoko Fukasawa, Deloitte Touche Tohmatsu LLC

Contact: momoko.fukasawa@tohmatu.co.jp

Data scientists working for an auditing firm are frequently requested to provide quantitative estimation of risks via mathematical models. Recently, the increased number of companies are more concerned with, among many kinds of analysis topics, fraud risks by their employees than before, which is probably due to collapse of lifetime employment trend of Japan resulting in less loyalty by employees. Difficulty of employee fraud analysis is that companies are not willing to share important part of data including demographic information of employees and functions of specific departments frequently used to decide riskiness of transactions. I will show social networks of employees and departments combined with past data help measure fraud risk and can be effectively included as variables into simple statistical models using actual business transaction data even when some anonymity of data exists. A typical problem of fraud analysis is not to miss to catch fraudulent transactions. Rather, a problem is that it tends to pick up too many "innocent" transactions as fraudulent. Thus, I will evaluate the result from both points of view, how many fraudulent transactions correctly receive high risk measure and how many "innocent" transactions successfully receive low risk measure, and compare with simple models without network variables. It turned out that models with network variables estimated more correctly compared with the ones without network variables, which allows to deduce meaningful conclusions from incomplete data.

Missing Data FRI.AM1

The effects of social isolation and social contagion on survey nonresponse in a panel network study

KyungWoo Kim, University of Illinois at Chicago, Meng-Hao Li, Eric Welch

Contact: kkim202@uic.edu

Unit nonresponse bias often occurs in social surveys and is difficult for researchers to recognize where the bias comes from. Social isolation theory suggests that isolated people are likely to decline to participate in the survey because those people deem that the survey request presents the interests of the dominant society, while busyness theory argues that people normally refuse to participate in the survey because they are possible to be involved in enormous social activities. Both theories seem to contradict each other. If both were accurate, we would see that no one is willing to engage in the survey. Thus, this study claims that the unit responses may have an inverse U curve relationship with isolation and busyness using the existing relational data from a sampled population as a proxy of social isolation and busyness to explain why a sampled unit decides not to participate in the survey. The data that we employed were scholarly project collaboration networks from a sampled population and the corresponding panel survey data conducted in a Midwest university in 2010, 2011 and 2012. The preliminary findings confirmed our hypothesis showing the unit responses have an inverse U curve relationship with isolation and busyness. The sampled units with high or low numbers of project collaborators are likely to reject to participate in the surveys. The findings are expected to contribute to the understanding of how features of individuals' networks affect survey nonresponse bias.

Missing Data FRI.AM1

What happens when you don't have a complete collection of a network?

Steven Tuttle, Leidos, Richard LaValley

Contact: tuttles@leidos.com

When considering the practical "real-world" applications of Social Network Analysis techniques and metrics, it is imperative to recall that "real-world" datasets may violate some of the basic assumptions of the academic SNA community. Although there are multiple assumptions which may be violated by nonhomogeneous links, agent types, and multi-modal datasets, the largest impediment to correct interpretation of SNA results and metrics appears to be the use of incomplete datasets. Often the research community utilizes undergraduate populations and can feel confident in a near complete, if not totally complete, data collection of

the target population. When considering the “real-world” applications of these techniques, especially within the law enforcement, intelligence, and counter terrorism communities, the datasets tend to be far more sparse, almost never lending themselves toward being viewed as complete. It is almost never possible to know what the complete network that exists is, or what total percentage of the network that has been collected. This uncertainty and the interpretation of the results can be problematic when using many of the standard SNA methodologies. This study explores the effect on key SNA metrics and complexity structure of the network in various sizes of samples of several real world networks. This effort should provide some insight to SNA’s practical use community on the veracity of conclusions drawn from SNA techniques. Which may allow for a more educated interpretation of results when the data utilized is by definition incomplete.

Mixed Methods Studies FRI.AM1

Mixed Methods Studies FRI.AM1

Assessing the Trouble with "Measures of Effectiveness": A Social Networks Analysis Approach

Douglas Jordan, Joint Special Operations University MacDill Air Force Base, FL University of South Florida Department of Communication Tampa, FL

Contact: djordan3@mail.usf.edu

The United States Government has struggled for several years to measure the effectiveness (MOE) of communication campaigns targeting foreign audiences in support of military actions. Several studies have attempted to assess the causes of these difficulties. In this paper, the author, a member of the communication community of practice, applies a mixed methods research design to attempt to identify the issues that are influencing this discussion. The authors uses his own social network in the form of his "Linkedin" network to attempt to identify members of the community, their perceptions of the challenges to MOE, and to determine which members of the network who are influential and who are advice providers. This approach serves as a case study for how social network analysis theories and methods might be used in combination with communication research methods that are both quantitative and qualitative to help diffuse innovation. This paper applies aspects of Granovetter's theory of "weak ties" and uses an online communication survey of the members of the author's network to attempt to graph the frequency and direction of communication within the network as well as some attitudinal data to identify key nodes that might be targeted to affect change within the community of practice.

Mixed Methods Studies FRI.AM1

Qualitative methods, network boundaries and hidden mechanisms in network research

Elisa Bellotti, University of Manchester

Contact: elisa.bellotti@manchester.ac.uk

The presentation explores the role of qualitative methods in empowering network research by addressing some of the difficulties normally faced by formal network analysis. In particular, it will focuses on the advantages of using a mixed method approach for defining network boundaries and uncovering hidden structural mechanisms. Drawing on different case studies, which combine different methods, the aim is to explore the potentials of adopting a mixed method research strategy in the study of social networks.

Mixed Methods Studies FRI.AM1

The linguistic affordances of campaign context: Using discourse analysis, corpus linguistics and network analysis to measure narrative cohesion and issue preference

Amoshaun Toft, School of Interdisciplinary Arts and Sciences University of Washington Bothell

Contact: atoft@uw.edu

This paper presents a multi-methods 'lexical fields' approach to the analysis of how political campaigns vary in terms of their linguistic affordances. Communication as action in the public sphere takes place within a complex context of associated meanings that structure the affordances of an issue sector, encouraging some ways of speaking and discouraging others. Genre expectations, ideological perspective, and cultural meanings all influence what we say, resulting in semi-stable patterns of representation around important events, issues and identities. I show how network analysis can be combined with corpus linguistics and discourse analysis to explore the online semantic profile of three campaigns around homelessness in a major metropolitan city. Rather than relying only on computational tools, this methodological combination allows for the iterative construction and measurement of those lexical fields that represent important areas of cultural meaning for a research question. As stable yet contested aspects of our society, these lexical fields can be seen as battlegrounds of associated meanings – such as whether people labeled as 'homeless' are dangerous, dirty drug addicts. The analysis suggests that not all issues are equally open to contestation, with the three issues analyzed here displaying widely differing levels of narrative cohesion as measured by network centralization metrics. Further, each issue area relied on a different set of lexical fields to tie the network together, privileging associations between criminality and policing in one issue network compared to shelter and home in another. Methodological and phenomenological implications are discussed.

Mixed Methods Studies FRI.AM1

Translating Social Network Analysis into Wisdom Research: Visualization and Centrality Analysis of Laypeople's Conceptions of Wisdom

HUNHUI OH, St. Ambrose University

Contact: hunhui.oh@gmail.com

Wisdom is multifaceted. Despite no uniform definition, much literature concurs that wisdom has triadic components; cognitive, reflective, and affective. Different conceptions of wisdom among laypeople and thus varying types of these ties among the wisdom components can be

better understood by adopting typological mapping tool and social network analysis. The present study contains wisdom-related in-depth interviews and survey data (n=101) collected from the U.S. as a part of multinational wisdom study. A mixed-method design adopted MAXQDA, SPSS, and UCINET in order to (1) come up with extreme wisdom groups for in-depth comparisons, (2) compare group differences in psychometric measures including wellbeing and subjective health, and (3) draw relational networks among personal wisdom definition (wisdom characteristics) according to the triadic, dyadic, and isolated/null group. The findings showed that a triadic tie among wisdom components was a best fit in wisdom development. The higher wisdom score group with triadic ties of the wisdom components reported higher life satisfaction and better subjective health status than the lower score groups. Visualization of the network of wisdom characteristics reported by the participants and the result of centrality analysis showed that the bottom group (i.e., the isolate and null group) identified more egocentric attributes as wisdom characteristics, whereas people in the triadic group appreciated the virtue of prosocial behaviors and learning from experiences and others. With enhanced information of the relational structure of wisdom components, the present study invites further investigations on the detailed contextual knowledge on catalysts and deterrents of wisdom development in person over the life course.

Mixed Methods Studies FRI.AM1

Intelligence Applications of Social Network Analysis: Syrian Refugees, Counterterrorism and Nuclear Non-Proliferation

Kristen J. Wheaton, Mercyhurst University, Melonie Richey

Contact: kwheaton@mercyhurst.ed

Social network analysis has a broad range of applications within the field of intelligence studies. This presentation will focus on a series of applications within the domain of national security addressing the use of social network analysis to identify radical extremists on the Internet, to analyze key networks within the nuclear non-proliferation community and to simulate refugee population movements across strategic borders such as the Turkey-Syria border crossing.

Multilevel Network Analysis FRI.AM1

Multilevel Network Analysis FRI.AM1

Multi-Level (Non-)Linear Model Specification for Network Data: Development and an Application to Role Stress Theory

David Dekker, University of Greenwich

Contact: david.dekker@gmail.com

This paper develops a (non-)linear network model specification of effects of nodal level variables on tie level variables. Admittedly, it could suffice, in cases where hypotheses are formulated as effects on, for example, an average tie or extremal tie value, to do a nodal level analysis. It is more common however that hypotheses are formulated as mean effects conditional on alternative tie-level effects. In linear network models, multi-level effects as these are often specified by entering nodal variables as fixed effects. Nodal attribute scores are put into a matrix of size equal to the network under analysis and entered into the regression equation. A worrisome disadvantage of this type of modeling is that it makes implicit assumptions about competing hypotheses. As can be easily shown effects attributed to a nodal level variable, could in fact be caused by nodal differences. This paper first develops a new type of model with the important feature that it allows to separate effects due to nodal attributes, nodal attribute differences and reciprocal effects between nodes. This model is non-linear in nature, but can be estimated from a linear reformulation similar to the derivation of an equilibrium-correction specification in time series analyses (see \nocite{Dekkeretal2003} Dekker et al. 2003). Here an application to role stress hypotheses \nocite{Kahnetal64} (Kahn et al. 1964) demonstrates how this type of modeling can further the development of theory. The results of the analyses suggest confirmation of the role stress hypotheses even while controlling for other tie level explanatory processes.

Multilevel Network Analysis FRI.AM1

Sociomateriality as an Ontology for Multilevel Social Networks

Amanda Beacom, University of Southern California

Contact: abeacom@gmail.com

This research examines the use of sociomateriality as an ontology for multilevel social networks with human and nonhuman nodes. The recent development of multilevel ERGMs in MPNet offers new opportunities for analysis of multimode networks. Although MPNet was designed

for hierarchically nested data, with each mode representing a different level of the network, it is flexible enough to also accommodate a network that is not inherently hierarchical. In such a “nonhierarchical” multilevel network model, the definition of the “levels” is not determined by the hierarchical classification of the nodes (e.g., individuals vs. groups), but by specific attributes of the nodes (e.g., human vs. nonhuman). Sociomateriality offers an ontology for conceptualizing a specific form of such nonhierarchical multilevel networks, those consisting of two modes, humans and nonhumans, and the relationships within and between these modes. A core idea of sociomateriality is that both humans and nonhumans, such as material artifacts and technologies, mutually contribute to and are affected by social structures and phenomena such as social networks. In this research I review how human and nonhuman actors have been traditionally conceptualized in social networks; outline concepts in sociomateriality relevant to its application to multilevel social networks; elaborate a sociomaterial conceptualization of multilevel social networks; and examine how sociomateriality may be applied to an empirical example: the communication of best practices in an intraorganizational knowledge network, in which the nonhierarchical levels represent two types of nodes: people who are seekers and sources of knowledge, and knowledge artifacts such as websites and databases.

Multilevel Network Analysis FRI.AM1

Using Multiple Membership Multilevel Models to Examine Multilevel Social Networks

Guang Ying Mo, Department of Sociology, University of Toronto, Barry Wellman

Contact: oliviamo@hotmail.com

This study uses a unique approach to combine a multilevel model and social network analysis. Multilevel models are well-known for their strengths in uncovering particular mechanisms through the linkages between the micro-level and the macro-level. However, this method largely ignores the interactions among group members at the micro-level. Meanwhile, models for multilevel networks, as an advanced social network analysis method, shed light on the multiple layers of networks and the linkage between them. This method provides an effective way to illustrate the complexity of network structures. However, models for multilevel networks are not able to substitute multiple level models, particularly in organizational settings. This is because models for multiple networks assume that the network structure is flat and ignore the hierarchical dimension. In organizations, hierarchy still exists and is often in alignment with formal networks or work units. Models of multilevel networks alone may not be able to fully elaborate the mechanisms between networks at various levels. Hierarchical structure may constraint the development of networks among members in organizations. Members affiliated with the same work units are more likely to build ties amongst one another. Multiple level models may provide some useful resolutions when trying to understand the links between networks at the micro-level and those at the macro-level. In this paper, we propose a model that can be used to analyze multilevel networks, particularly taking the meso-level

network into consideration. We offer an example to examine a Canadian research organization, GRAND NCE (Networks of Centres of Excellence).

Sex, Drugs, and Social Networks FRI.AM1

Sex, Drugs, and Social Networks FRI.AM1

Linking Drug Treatment Clinic Patients and Active Drug-using Network Members for Peer Health Intervention Delivered by Trained Patients as Peer Health Advocates

Margaret Weeks, Institute for Community Research, Jianghong Li, Chris Heneghan

Contact: mweeks@icrweb.org

Peer intervention delivered by trained drug users to their network members has been demonstrated as highly effective in reducing HIV, other health risks and harm among networks of heroin and cocaine users. The Risk Avoidance Partnership (RAP) demonstrated the ability of active drug users to become Peer Health Advocates (PHAs) through a curriculum that trained them to bring harm reduction information, materials, and demonstrations to their network members in high- and low-risk community settings. Engagement in peer intervention delivery and receipt of peer intervention from PHAs resulted in reduced drug use and HIV risk behaviors, and increased drug-treatment entry. Analyses of trained PHAs' ego networks (e.g., high percent of network members giving/receiving peer intervention) and the macro network of study participants (e.g., density of intervention ties, geodesic distance to active PHAs and highly-active interventionists) in the original community intervention trial demonstrated the importance of network properties for explaining RAP peer intervention reach, process, behavioral outcomes, and network-level impacts. RAP findings supported seeking other venues for implementation of this effective drug-user peer intervention. We translated RAP for use in outpatient drug-treatment clinic settings and piloted it with 17 patients. Critical to efficacy will be the ability of clinic patients to reach and provide intervention to their not-in-treatment drug-using network members. We examined network characteristics to assess potential for reach and influence of clinic patients to effectively promote risk/harm reduction with their active drug-using peers. Findings suggest high potential for replicating original RAP trial outcomes via clinic patient PHAs.

Sex, Drugs, and Social Networks FRI.AM1

Personal, Relational, and Network Effects on HIV Transmission

David Bell, Indiana University Purdue University Indianapolis

Contact: dcbell@iupui.edu

Networks affect behaviors and the consequences of behaviors in complex ways. Actors may target their behaviors to different partners based on their location within the network. At the same time, network configuration may amplify the effects of individual and relationship characteristics so as to propagate the consequences of behaviors through the network. Changes over time within relationships and partner change, including termination of old relationships and formation of new relationships, may have short-term and long-term effects on network outcomes. In this paper, I examine results from 10 years of research on networks and HIV transmission risk. Analysis focuses on a series of simulations in which estimated population parameters are generated from data collected in a network study of HIV transmission risk in high drug-use neighborhoods of Houston, Texas. A second study in the same environment collecting three years of longitudinal observations is used to investigate network change among partners (partner change) as well as relationship change between partners (trajectories of behavior). Results indicate that individual differences (in HIV status and number of risk partners) increase prevalence of HIV relative to random mixing. Network structure in Houston, emphasizing small local networks, and behaviors tailored to a specific partner each reduce prevalence by about the same amount. The major contribution to transmission appears to be partner turnover, which increases prevalence four-fold.

Sex, Drugs, and Social Networks FRI.AM1

Sexual Contact Networks, Mobility, and Infection Risk Among Pastoralists in Namibia

Ashley Hazel, Stanford University

Contact: mahazel@stanford.edu

Partner concurrency is common for men and women of the pastoralist tribes in Kaokoland, Namibia. People meet with spouses, long-term extramarital partners, and one-night stands while they travel through traditional migratory corridors as part of their seasonal subsistence strategy. Kaokoland is a remote, rural landscape, where access to healthcare is erratic, making sexually transmitted disease burden (e.g. genital herpes and gonorrhea) very high. Using travel data and sexual contact data collected in 2009, we explored sexual network structure and mobility across several regions of Kaokoland to understand how geographic remoteness influences individual and aggregated contact structures and infection risk. Although Kaokoland has a longstanding history of being geographically, socially, and economically isolated, there is increased migration into Kaokoland from adjacent districts with high HIV prevalence. With this in mind, we also explored data on people's travel habits to identify where and how traditional mobility is giving way to more urban travel and interactions with people from outside Kaokoland. We further explored how emergent mobility trends could hypothetically create new transmission pathways, particularly by creating network bridges between remote areas of Kaokoland and growing peri-urban settings. We will extend our discussion of our findings to

consider how these patterns are relevant to other areas of Africa experiencing increased mobility in rural areas and peri-urban growth.

Sex, Drugs, and Social Networks FRI.AM1

Varying criteria for tie confirmation among free-listed alters in sociometric networks:
Implications for network structure

April Young, (1) Department of Behavioral Science and Health Education, Emory University Rollins School of Public Health; (2) Center on Drug and Alcohol Research, University of Kentucky College of Medicine, Ursula Mullins, Adam Jonas, Jennifer Havens

Contact: apyoung@gmail.com

Background: Criteria used to confirm ties between individuals in sociometric networks for epidemiologic research are not well-described and likely vary across studies. The purpose of this study was to examine the impact of variations in tie confirmation criteria on network structure in a sample of high-risk drug users. Methods: Data were collected from 503 drug users enrolled in a cohort study in Appalachia (US). Network ties involved recent (past 6 months) sex, drug co-usage, and/or exchange of social support. Participants provided alters' first names, last initials, ages, and genders. To construct the sociometric network, these data were compared to that of other participants. Several networks were constructed using varying combinations of confirmation criteria (i.e. varying requirements for accuracy of age estimates, gender, and name match). The impact on number of ties and isolates, main component size, degree centrality, density, and transitivity was evaluated. Results: When requiring accuracy in name, initial, and gender, the impact of loosening the criteria for age guess accuracy from three to five years, results in a 10% increase in the number of ties, 23% increase in main component size, 25% decrease in the number of isolates, 10% increase in average degree centrality, and a decrease in transitivity (5.85% to 5.18%). No change in density was observed. Conclusions: In this sample, relatively minor variations in tie confirmation criteria result in substantial changes in network structure. These findings have implications for inferences drawn and underscore the need to disclose and critically examine the criteria used in network-based epidemiologic studies.

Sex, Drugs, and Social Networks FRI.AM1

Who Are the Party People? The Effect of Organizational Membership on Recreational Drug Use

Chan S. Suh, Cornell University, Matthew Brashears, Michael Genkin

Contact: cs683@cornell.edu

This paper examines the influence of organizational membership on adolescents' use of recreational drugs, with a specific focus on the effect of simultaneous membership in multiple types of organizations. While past studies have focused either on the learning effect of involvement with delinquent organizations or on the constraining influence of conventional organizations on adolescent delinquency, we explore the possibility that conventional organizations cease to act as a force of constraint and transform into socializing opportunities for already delinquent members to enhance their status and reputation. Using the Add Health data, we find that, while members of conventional club organizations are less likely to engage in recreational drug use, members of both delinquent and conventional organizations use drugs at greater levels than members who are solely in delinquent organizations. This effect is especially pronounced for delinquent organizational members who are also involved in athletic or artistic clubs. This result has important implications for explaining party-oriented delinquency and suggests that the study of delinquent behaviors would benefit from devoting more attention to the effects of organizations.

Words and Networks FRI.AM1

Words and Networks FRI.AM1

Argument Networks in the Context of Disciplinary and Interdisciplinary Communities

David Elliott, University of Missouri

Contact: dle46f@mail.missouri.edu

This paper will introduce and illustrate a formal, multiplex network representation of academic arguments within the context of the sociocultural community of researchers constructing them. Drawing from Abbott's (2001, 2005) theoretical framework in sociology, social structure of American academia is assumed to consist of academic disciplines, college majors (and other programs of study), and the university departments organized by disciplines and majors. I adapt Diesner and Carley's (2005) multi-matrix approach to representing socio-technical networks to the problem of representing sociocultural communities of researchers. Agents are researchers, each with the social structural attributes of having a discipline of training, a discipline of teaching, a stage in academic career (as can be measured by rank or years since Ph.D. earned), and an affiliation with an academic department and/or a research center. These departments and research centers are analogous to the "organization" entity in Diesner and Carley's approach. Events are publications (articles or books), and each event entity expands into a network of concepts linked by rhetorical moves in an argument to other concepts within the publication and to concepts in other publications by in-text citations (involving the contents of the citation contexts). The concept and citation context/content analysis is informed by the work of Teufel (2010) and others in the area of automatic citation classification and argument modeling. The network representation will be illustrated through the coding and classifying of an article from my larger sample of articles and books from a recent debate in the interdisciplinary field of bioethics.

Words and Networks FRI.AM1

Coding Communications across Time: Documenting Changes in Interaction Patterns between Adopter Categories

Kar-Hai Chu, University of Southern California, Stephanie Dyal, Anupreet Sidhu, Heather Wipfli, Thomas Valente

Contact: karhai.chu@usc.edu

In 1992, the Union for International Cancer Control formed GLOBALink (GL), a network of tobacco control professionals. Two decades later, GL has grown into a large online network

dedicated to controlling tobacco use. One major topic of focus was the World Health Organization's (WHO) Framework Convention on Tobacco Control (FCTC), an international treaty aimed at reducing the global burden of tobacco-related death and disease. The 192 Member States of the WHO unanimously adopted the FCTC in 2003; today, 177 countries have ratified the treaty. In this paper, we examine and compare the roles that different countries served in the GL community during FCTC negotiation and ratification. Previous studies of FCTC ratification found the process adhered to a diffusion of innovation model. We follow that work by conducting content analyses of discussion messages posted by GL members representing different countries. Each country is labeled by one of the five classifications from the diffusion model and we investigate the amount of shared word use between the different groups. A goodness-of-fit chi-squared test was performed to determine whether content was shared between the groups with expected frequencies. The results showed that interactions were not equally distributed $\chi^2(14, N=28534) = 8806.76, p < .0001$. We also calculated the E-I ratio, measured at 0.39. Innovators had the highest E-I ratio at 0.97; early majority adopters had the lowest at 0.10. A deeper look at the specific words shared between the classifications provided insight into how interactions between certain countries might serve to support the ratification process.

Words and Networks FRI.AM1

Comparison of network data constructed from text data and textual meta-data

Jana Diesner, University of Illinois at Urbana-Champaign, Sean Wilner, Amirhossein Aleyasen, Shubhanshu Mishra, Kiumars Soltani

Contact: jdiesner@illinois.edu

Coding texts as networks – a process also known as relation extraction – allows for constructing or supplementing network data. This approach is particularly useful when alternative methods for collecting network data fail, e.g. in the case of covert or historic networks, and when jointly considering social network data plus information produced or shared by network participants. Relation extraction techniques require humans – developers as well as end-users - to make choices about appropriate methods and parameter settings. The impact of these choices on the resulting data and findings can be strong, but is insufficiently understood. We have been addressing this problem by conducting a series of controlled, empirical experiments that we will report on in our talk. More specifically, we are extracting network data from the substance of the text data collections as well as from meta-data pertaining to these text corpora. We use co-occurrence based and syntax based relation extraction techniques; two of the most common relation extraction techniques. The results are compared against ground truth data and each other. We use Context, a tool that supports relation extraction and the joint analysis of text data and network data, for this purpose. Observed trends in the similarities and differences in network structure and behavior depending on the employed method will be discussed. Finally,

we show how these methods can be combined to gain a more robust and comprehensive understanding of a network.

Words and networks FRI.AM1

Media Multiplexity and Network Diversity in Iran

zohre shahriyari, susan bastani _ PHD from university of Torento, student of Barry Wellman_,
susan bastani

Contact: z_civilization@yahoo.com

Networking in Iran, likemost other countries, involves significant use of media to maintainrelationships. This research examines the use of media - telephone, mobile, sms, internet (email, socialnetworking sites, and instant messaging services) - and face to face contact inTehranis' networks and its effects upon networkdiversity. In order to identify the effects of media use on network's diversity,this paper relies on the social affordance approach. The analysis is based on 277 structured, face toface interviews that were conducted with individuals aged 18 and over. The sample represents Tehrani households who were randomly chosen from differentdistricts of the city.Findings indicate that respondentsare more likely to use a certain kind ofmedia only when its capabilities fulfills the purposes of an interaction and issuitable for the situation in which communication occurs. Although mediaaccessibility causes network change, social accessibility as an intermediatemechanism influences the association between media accessibility and networkdiversity. Based on the results,individuals' network are a combination of features of door to door, place toplace, and person to person models; all ofthese styles are present in everyday life as Hogan mentioned before. Findings also show that althoughindividuals with more online interactions have larger and more diversifiednetworks, internet use is reinforcing the pre-existing glocalization ratherthan networked individualism. Internet use in Iran is adding to other forms of communication,rather than replacing them. Despite the low speed of the Internet and its filtering,the expansion rate of internet usage is high.Keywords: media use, mediaaccessibility, social network, social accessibility, social affordance, Iran.

Words and Networks FRI.AM1

In the Name of Love: Revisiting 'Naming Networks' in the Hollywood Hearings (HUAC)
Using NLP and Sentiment Analysis Techniques

Oren Tsur, Harvard & Northeastern University, Dan Calacci, David Lazer

Contact: orentsur@fas.harvard.edu

The Hollywood Blacklist, published in the late fifties and early sixties, was based on a series of investigations and interviews conducted by the House Committee on Un-American Activities (HUAC), trying to identify members of the communist party. We use various Natural Language Processing (NLP) algorithms in order to automatically analyze a large corpus of interviews in order to construct a network of the industry members and their "naming" relations. We further use algorithms for Sentiment Analysis in order to add a psychological dimension to the edges in the network. In particular, we test how different types of connections are manifested by different sentiment types and attitude of the interviewees. We also test how the attitude of an interviewee toward the process is reflected in her "naming" decisions. Analysis of the sentiment types expressed in the hearings can shed new light on the motivation and role of network members.

Mesa Hispana FRI.AM2

Mesa Hispana FRI.AM2

Institutional Networks an approach to the Mexican scientific structure

alejandro arnulfo Ruiz Leon, Universidad Nacional Autónoma de México

Contact: rarnulfo@unam.mx

As an approach to the study of the Mexican scientific structure for the years 1981 to 2003, communities are detected in institutional networks. Using the information on Mexican scientific production the institutional networks of coauthorship and citation are generated and analyzed first regardless of thematic classification of items, and later in the two most important areas: Clinical medicine and Physics. The structure is analyzed combining techniques; initially subnets are determined with a high degree of interaction (K-cores) and as a second step they are analyzed by their degree of similarity between actors (VOS) for the coauthorship network and important vertices (authorities and hubs) for the citation network. In the case of Mexican scientific structure from 1981 to 2003, mostly universities and educational institutions build the scientific communities. Even though the importance of the Universidad Nacional Autónoma de México (UNAM) within the scientific structure of the country is shown again, research efforts imply that there are six other institutions that are part of the collaboration network regardless of thematic classification of items and in both Clinical Medicine and Physics collaboration networks: Benemérita Universidad Autónoma de Puebla, Centro de Investigación y de Estudios Avanzados del Instituto Politécnico Nacional, Instituto Politécnico Nacional, Universidad Autónoma de San Luis Potosí, Universidad Autónoma Metropolitana y Universidad de Guanajuato.

Mesa Hispana FRI.AM2

Las variaciones de la norma de la igualdad en parejas homoparentales. Solidaridades diádicas alternativas

Ainhoa de Federico, CERS-LISST University of Toulouse, France, Jérôme Courduries, Martine Gross

Contact: ainhoa.defederico@univ-tlse2.fr

Desde los trabajos de Elisabeth Bott en la escuela de Manchester la sociología de la familia se articula con el análisis de redes personales y se estudia la relación entre los roles igualitarios / complementarios con respecto a la red personal de las parejas. Atendiendo al vínculo diádico de

pareja y a las solidaridades e interdependencias que comporta, en las parejas heterosexuales, el dinero, la gestión de recursos y el reparto de tareas domésticas y parentales constituyen frecuentemente instrumentos de una jerarquización de los lugares y los roles. En esta presentación nos interesamos por las mucho menos estudiadas parejas de mismo sexo con hijos. Algunas investigaciones han mostrado que, en las parejas de mismo sexo, el reparto del trabajo doméstico constituyen un juego de poder y que, en este, los recursos financieros tienen un papel importante (Carrington 1999, Courduriès 2011). En otros casos, la diferencia de salarios favorece una menor implicación en el trabajo doméstico para quien aporta la parte más importante de los recursos conyugales. Al mismo tiempo, y tal como se ha demostrado en las parejas heterosexuales, una diferencia importante de recursos constituye también un instrumento de jerarquización conyugal. En esta comunicación nos basamos en una encuesta mediante cuestionario realizada en 2012 a un conjunto de hombres y mujeres en pareja homosexual y que educan juntos uno o varios niños. Nos interesamos en las prácticas domésticas y parentales, en su distribución más o menos igualitaria de forma acorde con el discurso normativo dominante al principio de la vida de las parejas (Henchoz, 2008). ¿Equivale la norma igualitaria a una igualdad estricta al trabajo doméstico y parental? ¿Es la igualdad de la pareja mayor al no haber diferencias de género internas a esta? Avanzamos la hipótesis de que encontraremos una mayor igualdad que en las parejas heterosexuales pero también que los factores de jerarquización social internos y externos a la pareja conducen a una diversificación de la aplicación de norma de igualdad conyugal. Exponemos algunos de dichos factores. Referencias bibliográficas Carrington Christopher, *No Place Like Home : Relationships and Family Life among Lesbians and Gay Men*, Chicago, University of Chicago Press, 1999. Courduriès Jérôme, *Être en couple (gay). Conjugalité et homosexualité masculine en France*, Presses universitaires de Lyon, collection « Sexualités », 2011. Henchoz Caroline, *Le Couple, l'amour et l'argent. La construction conjugale des dimensions économiques de la relation amoureuse*, Paris, L'Harmattan, 2008. [1] LISST-CAS (UMR 5193), Université Toulouse 2. [2] LISST-CERS (UMR 5193), Université Toulouse 2. [3] CEIFR (UMR 8216), CNRS.

Mesa Hispana FRI.AM2

Los colectivos: un recorrido histórico por los espacios alternativos en el mundo del arte mexicano desde los años 80

Nina Jung, National Autonomous University of Mexico, Larissa Adler-Lomnitz

Contact: nina.ines.jung@gmail.com

El mundo de los museos y las galerías está abierto a artistas que ya son consagrados, al mismo tiempo implica haber expuesto para tener fama. Eso complica la situación de artistas jóvenes y aún no reconocidos. Bajo estas circunstancias, desde los años 80 y 90 en México, han surgido espacios auto-organizados y financiados, donde un grupo de personas se juntaban para experimentar, aprender, dialogar e identificarse. Espacios para coexistir en ese mundo artístico

tan elitista. A estos espacios nos vamos a referir como colectivos. Las preguntas que guían nuestro trabajo son ¿cuál es la relevancia y el impacto de dichos colectivos en el mundo artístico mexicano? ¿cómo surgen y evolucionan? ¿cómo se organizan, qué/quién los junta y qué/quién los separa? Argumentamos que para la sobrevivencia de los colectivos a largo plazo eso requiere un grado de formalización e incluso institucionalización. Aunque cada colectivo es diferente, pueden ser estructuralmente iguales y caracterizarse por la presencia de los siguientes seis personajes: los mismos artistas, los asesores, los administrativos-organizadores, los patronos, los docentes-tutores y los curadores. Cabe señalar que no en cada colectivo van a aparecer todos los tipos de personajes, eso depende del enfoque que se le da a la actividad del mismo. Proponemos analizar las redes individuales de siete colectivos de la Ciudad de México y después nos dedicaremos al análisis de la red completa, compuesta de estos siete, para ver personas centralizadores, como arrojan nuestros resultados, varias personas participan o participaron en más de uno de estos espacios.

Negative Ties and Signed Graphs FRI.AM2

Negative Ties and Signed Graphs FRI.AM2

Powerful Nodal Positions in Politically Charged Networks: A Political Independence Perspective

Joe Labianca, University of Kentucky, Alexandra Gerbasi, Virginie Lopez-Kidwell

Contact: joelabianca@gmail.com

We explore the effects of structural position in “politically charged” networks, which contain both allies and adversaries on reservation price in a negotiation exercise. Power is derived from actors that are dependent on the focal actor and sociometrically weak, either due to a lack of alternative allies or from being threatened by others. We created a series of scenarios in which the focal actor is negotiating with an allies, but we varied the additional connections of the actors, in order to test the effect of their network position on their reservation price. When the focal actor has additional allies (besides their negotiation partner) this should lead to a higher reservation price; whereas when the focal actor has adversaries should lower the reservation price. We also extend this in two ways: first, we include effects of whether the focal actor’s allies have adversaries to see if this moderates the reservation price; second we include effects of whether the focal actor’s adversaries have allies to see if this also moderates the reservation price.

Negative Ties and Signed Graphs FRI.AM2

Structural Balance and Supreme Court Decisions

Patrick Doreian, Faculty of Social Sciences, University of Ljubljana, Department of Sociology, University of Pittsburgh, Andrej Mrvar

Contact: pitpat@pitt.edu

The US Supreme Court network has 30,288 decisions linked by 216,758 citations from later decisions to earlier decisions. In these data, the citation links were taken from the majority opinions and are recorded as positive binary ties. However, it is reasonable to think some of these citation links are negative ties implying the citation network is a signed network. We provide two examples of this. The first is a close examination of the Dred Scott decision that includes the dissenting opinions and subsequent decisions citing Dred Scott that are positive and negative depending on the decisions. The second example considers later Supreme Court decisions overturning earlier decisions and viewing these citation links as negative ties. The

question asked is simple to state: Is the signed Supreme Court network balanced in terms of the theory of structural balance? We find these signed networks are very close to being perfectly balanced. In terms of methods, the partitioning approach to signed networks is inappropriate. Instead, we define fragments of signed networks that are consistent or inconsistent with structural balance. There are far more fragments consistent with structural balance than inconsistent fragments. The implications of this are discussed.

Negative Ties and Signed Graphs FRI.AM2

Positive and Negative Tie Network Accuracy and Career Advancement in an Organization

Joshua Marineau, North Dakota State University

Contact: joshua.marineau@ndsu.edu

Organizations can be understood as a collection of individuals' unique patterns of relationships, or ties with others. These network ties provide critical social resources such as access to information, resources, and career sponsorship, which positively relate to outcomes, such as career mobility or promotions at work. While the link between one's structural position in the organization and outcomes has been well established, little attention has been paid to whether individuals' perceptions of network ties affect outcomes. While there is some evidence individuals' knowledge of the network can be a valuable resource, providing benefits, it is unclear whether those benefits also relate to employee performance outcomes, such as career advancement. Thus, the question we seek to answer is: does accuracy of the social network provide a unique resource unto itself, positively affecting one's career outcomes in the organization? We answer this question using cognitive social structure data collected in the call center of a large US restaurant equipment manufacturing firm. We find evidence that social network accuracy of the work-related trust and distrust networks increased chances for promotion compared to those who were less accurate. Contributions to social network theory, network cognition, and positive and negative tie perception are discussed.

Negative Ties and Signed Graphs FRI.AM2

The backbone of bipartite projections

Zachary Neal, Michigan State University

Contact: zpneal@msu.edu

The analysis and visualization of weighted networks poses many challenges, which have led to the development of techniques for extracting the network's backbone, a subgraph composed of only the most significant edges. Weighted edges are particularly common in bipartite

projections (e.g. networks of co-authorship, co-attendance, co-sponsorship), which are often used as proxies for one-mode networks (e.g. networks of collaboration, friendship, alliance) where direct measurement is impractical or impossible. However, extracting the backbone of bipartite projections requires special care. This paper reviews existing methods for bipartite projection backbone extraction, noting some of their disadvantages, and proposes a new method that offers a computationally efficient ($O(nm)$) and principled statistical test. This method, which involves the construction of empirical edge weight distributions from random bipartite networks with stochastic marginals, is demonstrated using data on bill sponsorship in the 108th U.S. Senate. The extracted backbone's validity as a network reflecting political alliances and antagonisms is established through comparisons with data on political party affiliations and political ideologies.

Network Dynamics FRI.AM2

Network Dynamics FRI.AM2

Closing Time: An Empirical Investigation of the Temporal Heterogeneity of Triadic Closure Processes.

Eric Quintane, UASM, Lucia Falzon, John Dunn

Contact: eric@quintane.net

The extant literature sees triad closure as an atemporal process. In this paper, we differentiate between two common triadic closure processes: transitive and cyclic closure, and argue that they exhibit different temporal behaviors. We characterize the temporal behavior of social processes by investigating their completion time and the extent to which characteristics of the individuals (and pairs of individuals) involved in the triads accelerate or decelerate these processes. We explore empirically the temporal heterogeneity of these two triadic closure processes using an e-mail dataset obtained from a medium sized organization. We present a model for the analysis of time-ordered interaction sequences that measures explicitly the duration of specific sequences of interactions. Our preliminary results show that these transitive and cyclic closure exhibit distinct temporal behaviors. We discuss how our findings affect the conceptualization of cyclic and transitive closure.

Network Dynamics FRI.AM2

Making (and losing) friends: Linking High Self-monitoring personality type to network churn

Adam Jonas, University of Kentucky Links Center for Social Network Analysis, Zackary Edens

Contact: abjonas@uky.edu

Personality dispositions such as High Self-Monitoring have been demonstrated to have a considerable impact on formation of new ties within organizations, referred to as network churn. However, studies have tended to focus on the increased accrual of ties by higher self-monitors and not the propensity to also lose more ties; this study examines that phenomena by investigating the dynamics of the friendship networks of 57 students at 7 time points within an American Master of Business Administration class. Data are analyzed using longitudinal network change statistics in UCInet 6 and multivariate regression analysis. Results reveal that higher self-monitors build and maintain significantly larger networks over time than lower self-monitors. Higher self-monitors also tend to exhibit much more network churn over time with both more new and lost ties. These findings indicate that higher self-monitors may be more

prone to have unstable networks that exhibit churn, adding to the growing body of research on antecedents of social network tie formation.

Network Dynamics FRI.AM2

The Development of Multiplex Ties

Hyeyeon Gong, McGill University

Contact: hyeyeon.gong@mail.mcgill.ca

Researchers in social networks have studied multiplex ties in terms of their key structural patterns and beneficial functions in networks. However, there is less knowledge on multiplex ties per se, such as their developmental process, compositions, and characteristics of multiplex ties. In this study, I focus on the developmental process and the properties of multiplex ties that have not been studied in the field of social network to date: Are there any specific patterns in forming multiplex ties? Why do multiplex ties have different properties and how do they manifest themselves? What are the different outcomes resulting from the properties of multiplex ties? I propose that there will be different developmental processes of multiplex ties in a dyad, such as the growth of the instrumental ties into expressive ties (I-E type) and the growth of the expressive ties into instrumental ties (E-I type). Also, I argue that the multiplex ties will have different properties depending on the developmental processes and, I focus specifically on trust of the initial tie (i.e., the cognition and affect-based trust) and on the dominant trust of multiplex ties. Moreover, I explain how the different properties of multiplex ties will affect individuals' evaluation of relational reciprocity and consequently influence tie activation and mobilization. Finally, I argue that individuals' characteristics (e.g., self-monitoring orientation) will influence the developmental process of multiplex ties; for example, high and low self-monitors will differently decide whether to maintain their existing ties or develop them into multiplex ties.

Networks in Education FRI.AM2

Networks in Education FRI.AM2

Friends in High Places? The impact of institutional prestige on the ego networks of academic scientists

Diogo Pinheiro, Savannah State University, Julia Melkers

Contact: diogolp@comcast.net

A substantial literature has looked at the impact that institutional prestige has on a number of individual career outcomes, from placement to satisfaction. The findings generally highlight the importance of the prestige of the PhD granting institution, and how doctoral prestige plays a role as the first step in a trajectory of accumulated advantages. The argument is that in a situation where initial placement is highly contingent on limited information, those who graduate from more prestigious departments will land in positions with more resources available, in turn increasing their long run success. While this pattern has been established for a number of different fields, substantially less attention has been paid to the impact of institutional prestige on ego networks. Ego networks can supply scientists with much needed resources and advising that they may otherwise lack, and as such this process can either substantially enhance or counterbalance the impact of institutional prestige on career trajectories. Using a nationally representative sample of academic scientists in biology, biochemistry, math and civil engineering across multiple institution types, this paper estimates the impact of institutional prestige on a number of different types of ego networks. Our findings suggest that institutional prestige, especially at the doctoral level, has a significantly positive impact on research resources obtained through personal networks, but that the picture is more complex when it comes to other types of resources.

Networks in Education FRI.AM2

It Takes a Village: Network Effects on Rural Education in Afghanistan

Matthew Hoover, Pardee RAND Graduate School; RAND Corporation, Hank Green, Dana Burde, Leigh Linden

Contact: mhoover@rand.org

Randomized control trials in international development are often used to demonstrate the validity and effectiveness of a particular intervention. However, the requirements for valid experimental results can be difficult to attain; this study seeks to identify how social networks

may be used to ensure better success for experiments. The interaction and characteristics of people create structural and compositional tendencies that often go unmeasured in social experiments, but can impact an intervention. In Afghanistan, an evaluation of a rural schooling access program found the program successfully increased enrollment and academic achievement, especially for girls. Data on children's playmate and friendship ties were also collected in the study and analyzed here to understand how children's relations affect schooling outcomes. Results using exponential random graph models (ERGMs) and multi-level models (MLMs) indicate that the relationships between children are predictive of student achievement. The ERGMs measure network structural and compositional tendencies between children (at the village level) using t-statistics from the ERGM terms as parameters in the MLMs. The MLMs relate these effects to children's individual-level outcomes. Preliminary results indicate potential network-based actions that could ensure stronger, more robust implementations of randomized control trials, such as increasing structured playtime in the school day, facilitating performance tracking, and providing an environment for additional friendship formation. Implementing organizations can use these results to tailor interventions to use natural underlying tendencies to improve child- and program-level outcomes.

Networks in Education FRI.AM2

School and Community Safety: A Case Study in the Field--Effective Social Network Analysis Strategies and Protocol for Use in Educational Settings

Ellyn Dickmann, University of Wisconsin-Whitewater

Contact: dickmane@uww.edu

This presentation, based on actual field studies (in one of the largest school districts in the US), is focused on the use of social network analysis (inter-organizational and intra-organizational) to support the development and maintenance of safer school and community settings. Two primary areas will be discussed: 1) The Use of Social Network Analysis, and 2) The Unique Culture/Environment of Educational Settings. Specifically in area 1, the use of social network analysis, use of available secondary data sources, and use of qualitative data from the educational environment will be discussed (mixed methods). In area 2 the following will be discussed: 1) social network analysis approaches and protocol; 2) obstacles and barriers related to the culture of educational environments; 3) strategies to gain entry to educational environments, community agencies, and law enforcement; 4) presentation tactics; 5) the importance of building capacity in educational environments to promote the use of social network analysis; and 6) effective strategies for utilizing results, i.e., policy development, changes in procedures, resource shifts, and program monitoring. *Although this presentation will focus on K-12 education settings—all educational settings will be mentioned as relevant, i.e., early childhood through post-secondary education.

Networks in Education FRI.AM2

Using Analytic-based Models for Formative Assessment to Motivate Online Course Discussion

Vanessa Dennen, Florida State University

Contact: vdennen@fsu.edu

Asynchronous discussion is a common online class activity, to motivate students by providing points of interaction and facilitate learning via discursive processes such as articulation, synthesis, and reflection. However, in practice students often tend to do the minimum required postings and have limited interactions with their peers. Factors contributing to minimal-posting behavior tend to be motivational, representing three components of Keller's ARCS model, Relevance, Confidence, and Satisfaction. Providing students with models and feedback related to discussion participation may help them overcome these motivational barriers, building confidence via modeling and satisfaction via concrete. This study explores the use of social network analytics as one form of formative assessment to help students better understand and visualize their current role in the class community and how that role compares to an ideal, highly active student. The study is situated in an undergraduate level online course. In this class, students were assigned to small discussion groups and required to post at least three times per week. Then, students were provided with sociograms depicting the previous week's discussion group interactions and explanations of how to read the sociograms. Model and exemplar students were indicated in the sociograms, so students could learn how to optimize their discussion participation. Some weeks, some students were presented with ego network diagrams and explanations. Student interaction patterns were analyzed over time, to see if student discussion participation shifted based on the network position feedback. Interaction patterns also were compared to a student motivational survey.

Networks, Economics, and Markets FRI.AM2

Networks, Economics, and Markets FRI.AM2

The Guanxi-Oriented Behaviors in the Chinese Venture Capital Industry

Jar-Der Luo, Sociology Department, Tsinghua University, Ling Zhou

Contact: jarderluo@126.com

Why do Chinese venture capitals invest jointly? Instead of rational choice or resource-dependency approaches, this paper utilizes network theory to analyze the networking behaviors behind syndication in China. This research thus aims to analyze the VCs' consideration behind building relations, rather than the motivations for investing behaviors. In interviewing some informants in this field, we find that Chinese VCs tend to group old partners and new entrants together for conducting a series of joint investments. They highly emphasize the importance of long-term social relations and status in the industrial network. In other words, they are guanxi (the Chinese term, relationship) oriented, rather than driven by short-term self-interest in each transaction. Following this observation, this paper thus first hypothesizes that the relationship distance between two investors in syndication is not too far or too close. Secondly, the centered role in the VC network has accumulative advantages. Thirdly, Chinese VCs tends to accept new entrants to be partners. Then, we collect the data of 4,164 VCs and 878,929 dyadic relations over the period from 1995 to 2011. While the three hypotheses are supported, we suggest that Chinese VCs are guanxi-oriented in syndication.

Networks, Economics, and Markets FRI.AM2

The Strength-of-Weak-Ties in China Revisited: A Within-Individual Test

Letian Zhang, Harvard University, Elena Obukhova

Contact: letian.lt.zhang@gmail.com

The Strength-of-Weak-Tie (SWT) hypothesis states that jobseekers benefit more from weak ties, or those they know less well, than from strong ties, or those whom they know well. While SWT hypothesis is intuitively plausible and appears to be well-supported by existing research, it does not appear to hold in China. In fact, the conventional wisdom suggests that for Chinese jobseekers strong ties are more effective than weak ties. However, most existing tests of SWT in China (as well as elsewhere) have relied on a between individual model that suffers from two well-known methodological shortcomings: unobserved individual heterogeneity and selecting on the dependent variable. In this paper, using data on 609 Chinese college graduates searching

for jobs, we show that while a test using the conventional between individual approach suggests that strong ties matter more to jobseekers, a test using within-individual comparisons finds evidence consistent with the SWT hypothesis. We find that while jobseekers are more likely to approach close ties, they receive more information and influence from acquaintance than from family and friends.

Networks, Economics, and Markets FRI.AM2

The structure of foreign direct investments relations in the international electricity industry: The role of geographical and network positions

Alessandro Lomi, USI - Lugano, Patrick Doreian

Contact: alessandro.lomi@usi.ch

According to received empirical evidence, the strength of economic and financial ties between countries is directly proportional to the size of their economies and inversely proportional to their geographical distance. According to this view, the global network of investment relations between countries should be highly clustered in geographical and attribute space. We contribute to this active line of research on international trade by studying the global evolution of the network of foreign direct investments (FDI) in the international electricity industry during the period 1994-2003. We assess the joint effects of geographical location and network position on the structure of the global network of FDI. We apply generalized blockmodeling techniques to describe how the global network structure of FDI has changed over time. We predict that during the decade covered by the study, geographical distance and country-specific attributes played a progressively less important role in determining the global structure of FDI relations. Conversely, we predict that the global structure of FDI became progressively more affected by the system of network positions emerging from the accumulation of decentralized investment relations connecting pairs of countries.

Networks, Economics, and Markets FRI.AM2

A Semantic Network Analysis of Corporate Environmental Responsibility Communication on Their Web Sites: A Comparative Study of South Korea and China

Se Jung Park, Georgia State University, Hongmei Lei, Han Woo Park

Contact: madeinpsj@gmail.com

In parallel with increased environmental contaminations and consumer demands on green products, leading corporations have strategically positioned themselves as environmentally responsible. This study examines how leading South Korean, Chinese, and US companies

communicate their corporate environmental responsibility (CER) principles on their web sites through a semantic network analysis. Corporations examined were sampled from the country's list of the top 100 largest corporations in terms of revenue. Analysis found that few Asian corporate web sites had CER information while the majority of the US corporations presented CER items addressing environmental sustainability initiatives, community involvement, and education as a separate section on their web pages. Semantic patterns of CER information suggested that Asian and American corporations framed CER principles and practices differently: while Asian corporations focused on promoting eco-friendly technologies as a competitive strategy and frequently used performance-related terms, the US corporations more employed collectivistic appeal such as commitment to global environmental communities and partnerships with NGOs and stakeholders. The different CER approaches reflect a higher-level environmental consciousness in the USA and relatively immature environmental efforts in Asian countries. The finding complicates Hofstede's theory of cultural differences between Asia and the West. This study shows that mapping a combination of words is useful to reveal a trend in corporate communications.

Sex, Drugs, and Social Networks FRI.AM2

Sex, Drugs, and Social Networks FRI.AM2

Consolidating Egocentric Networks of Young Men in Chicago

Michelle Birkett, Northwestern University, Lisa Kuhns, Brian Mustanski

Contact: birkett@northwestern.edu

Young men who have sex with men (YMSM) are at increased risk for multiple negative health outcomes, most notably HIV infection. Research with older MSM and other high risk populations suggest that network information is important for tailoring HIV interventions. However, little is currently known about the network connections of YMSM. This study examines the social, drug, and sexual networks of 175 YMSM in Chicago. Participants were between the ages of 17 and 23 at time of the network interview. The sample was 53.7% African American and 82.9% identified their sexual orientation identity as completely or mostly gay. Rich network data was captured via a method modified from Hogan and colleagues (2007). Each participant reported on average 14.7 social network members, 8.0 sex network members (within the previous 6 months), and 10.9 drug/substance use network members. Concurrent sexual relationships were common within the sample. Biological testing was administered at the time of the network interview with 10.9% HIV positive. This study will provide details regarding a process of matching and consolidating multiple egocentric networks to form a macronetwork.

Sex, Drugs, and Social Networks FRI.AM2

Contributions of the Social Network Analysis in relation to drugaddiction

Juan Machin, CAFAC, Edith Alcántara, Fernando Montoya, Estela Bahena, Benito Azcano, Maria Garcia, Olga Torres, Monica Romero, Abraham Monroy

Contact: jmachin85@gmail.com

The phenomenon of drug addiction is hypercomplex and its attention is necessarily equally complex and diverse. 3 case studies based on the model ECO2 drug addiction intervention are presented, related with prevention, community-based treatment and harm reduction, and the impact on drug policy (which currently they cause more harm than drugs themselves). The first case study is related to the prevention developed by CEJUV (a non profit organization) in a network of public institutions of higher Mexico City middle school, the second case study is related to community-based treatment and harm reduction that developed by Hogar Integral de

Juventud (a non profit organization) in the historic center of Mexico city, and the case study concerns the impact on public policy that Mexico has been developed by REMOISSS, a network of social organizations.

Sex, Drugs, and Social Networks FRI.AM2

Management of Social Networks: Migrant Women in Transactional Sex in Post-Socialist China

Yeon Jung Yu, Stanford University

Contact: yjy.anthropology@gmail.com

In this presentation, I will discuss the network patterns of female sex workers in southern China. My evidence comes from egocentric network surveys and my 26 months of ethnographic fieldwork (2006-2009) with women in the illegal sex trade. These women were largely rural-to-urban migrants, working in a capital city located in southern China (Hainan province). I begin by situating these migrant women in the social context relating to the illegal trade in China. Then I discuss my research findings. Deviating from the prevalent assumption that sex workers have very few social relationships or are isolated from the society, I find that the average sex worker has around fifteen meaningful people in her network. I also find that while the women often maintain ties to their area of origin (rural network), they have also established new resourceful relationships in their new context (urban network). Depending on how the two components are connected, I identify four patterns in the women's social networks: dense, strongly-connected, weakly-connected, and separated. These structural patterns are the results of the agents' management of their personal networks. I will discuss further the additional socio-economic factors shaping the structural patterns. Finally, I will address the implications of the generally assumed network property of "transitivity" (e.g., two persons naturally become acquainted if they share a friend) among others.

Sex, Drugs, and Social Networks FRI.AM2

The relationship between non-sexual networks and sexual risk behaviors among Younger HIV-infected Black men who have sex with men (YBMSM)

Tim Walsh, Chicago Center for HIV Elimination at the University of Chicago Medical Center, Dexter Voisin, Alida Bouris, Natasha Flatt, John Schneider

Contact: twalsh@medicine.bsd.uchicago.edu

In the United States, the burden of new HIV infections is highest among YBMSM ages 16-29. Social network approaches have been of increasing interest to recruit and provide interventions for hidden populations, such as YBMSM. Few studies, however, have examined the

relationship between the profiles of non-sexual networks and sexual risk behaviors among YBMSM. This represents the primary aim of this study. Baseline data were collected from Project nGage, a RCT exploring the role of social support in improving HIV primary care in YBMSM. Data were collected from a network sample (N= 276) of 80 HIV infected YBMSM ages 16-29. Major results indicated that 45% and 29% of respondents had at least 1 member of their close personal network that had betrayed their trust and that spent at least one night in jail during the past six months, respectively. Bivariate analyses indicate that several network profiles were associated with high risk sexual behavior. For instance, having a higher proportion of network members that had betrayed trust was significantly associated with unprotected anal sex with a partner of unknown sero-status, the use of drugs during sex, and having a sexual partner that had used drugs during sex in the past six months (all $p<.05$). Additionally, having a high proportion of network members who spent more than one night in jail in the past six months was positively associated with the use of drugs during sex ($p<.05$). These findings suggest that the profiles of non-sexual networks are associated with recent sexual risk behaviors among HIV infected YBMSM and that disruptions in social networks would need to be addressed when addressing the secondary HIV prevention needs of HIV positive YBMSM.

Social Support FRI.AM2

Social Support FRI.AM2

Characteristics of the Social Support Networks of Maltreated Youth: Exploring the Effects of Foster Placement

Sonya Negriff, University of Southern California, School of Social Work, Adam James, Penelope Trickett

Contact: negriff@usc.edu

This study examined group differences in social network characteristics and perceived social support between a) maltreated versus comparison youth and b) maltreated youth who remained with their biological parent, versus those placed with a foster parent, versus those placed with a kin caregiver. Data were drawn from three waves of a longitudinal study of child maltreatment (N= 454; 241 boys, 213 girls; 9-13 years old at Time 1). ANCOVA showed that at Time 1 maltreated adolescents named significantly fewer people in their network than comparison adolescents (M=12.28 vs.13.77, $p=.03$). For Time 2, comparison adolescents reported more same-age peers (M=5.49 vs. 4.52, $p=.02$). Within the maltreatment group, those with a foster parent reported significantly more older peers than maltreated youth with a kin caregiver (M=.86 vs. .20, $p=.05$). Fewer maltreated youth named a biological parent on the social support questionnaire at all three time points ($p<.05$ for all). Among maltreated youth, 97% of those who remained with their biological parent named them as a social support, compared with 74% of those in kinship care, and 63% in foster care ($\chi^2=26.86$ (1), $p<.01$). More youth in kinship care described their caregiver as supportive than did those in foster care ($\chi^2=16.74$ (1), $p<.01$). Lastly, at Time 3, maltreated youth living with a biological parent reported a higher proportion of older peers that were supportive (M=.05) than the maltreated youth with kin caregivers (M=.05 vs .01, $p=.03$). Implications for health and behavior problems will be discussed.

Social Support FRI.AM2

Childcare network and urbanization:-From the perspective of 'family/community issues'

Noriko Tateyama, kanto-gakuin university yokohama, Japan

Contact: tateyama@kanto-gakuin.ac.jp

A "family/community issue" approach categorizes the network resource allocation of individuals into two analytical objects, "in-family network" and "out-family network," by applying network analysis that treats the individual as a unit. Thus, we can examine

individuals' issue management tactics by the interrelationship between the family and community spheres. On the other hand, Research on personal networks in the urban sociology field has shown that the distribution and amount of networks relates to the "urbanization level." Therefore from the perspective of 'family/community issues' and with an emphasis on the level of urbanization, this paper examines how families position themselves as 'a family in a network' and recruit resources when they could not cope with childcare issues. This paper focuses on mothers having children aged from three to five and analyzes 1135 people, excluding single-parent households (city center: 365 people; suburbs: 349 people; villages: 421 people). First, for the analysis, we examined the child raising network space distribution and the network distribution pattern by level of urbanization. Second, we developed a child support score identifying how mothers receiving child support from outside the family relates to urbanization, mothers' attributes, and child raising support from within the family. Last, we analyzed the correlation between types of child rearing style between in-family and out-family networks, and the factors such as (1) mothers' friends and their relationships with them and (2) mothers' sense of isolation regarding childcare.

Social Support FRI.AM2

Does Civility Pay?: It Pays to Play Nice

Alexandra Gerbasi, Grenoble Ecole de Management, Christine Porath

Contact: gerbasi@gmail.com

There is widespread concern about a civility crisis. According to a recent nationwide poll, 70% of Americans believe that incivility has reached crisis proportions; 71% believe civility has declined in recent years; and the majority expect the decline to continue. Many people now see very little reason for civility; they believe that in our competitive and aggressive society civility is a luxury they simply cannot afford. If you're civil you may be perceived as weak, and ignored or taken advantage. As the environment continues to become more fast-paced, technologically complex, interdependent, and culturally diverse, building relationships is even more necessary to accomplish goals. We theorize that civility is a seed from which relationships blossom. Civility forges connections, allowing relationships and the benefits that flow to take root. In a longitudinal social network study of an international sample of MBAs (N=155), we find that civility pays. It affects who people go to for work advice, judgments about leadership and performance (over time). We also find that being sought for work advice and being viewed as a leader mediate the effect of civility on performance over time. Through respectful engagement people increase the likelihood that others come to them seeking—and presumably exchanging—information and advice, which in turn, increases performance over time. Rather than hurt themselves by appearing weak or deferential, behaving respectfully seems to garner influence—paving the way for future interactions and opportunities (e.g., recommendations for jobs).

Social Support FRI.AM2

Personal networks as a resilience resource: something about the network or something about the person?

Lindsay Richards, University of Manchester

Contact: lindsay.richards@postgrad.manchester.ac.uk

This research builds on previous work in which personal networks are found to have a buffering effect against the negative impact of financial stress on subjective well-being (SWB). It aims to determine if the observed pattern is a true “network” effect or an artefact of stable psychological traits that confound both networks and SWB (e.g. neuroticism, pro-social values). It achieves this by comparing the stressor-SWB relationship in the same individuals at different times, before and after a change in personal network, thus allowing an empirical separation of the network effect from stable psychological traits. The background for the study includes economic theory on the money-happiness relationship, psychological perspectives the role of stable traits, and sociological accounts of the influence of networks. The literatures on social capital and social support provide the basis for the measurement schema. The British Household Panel Survey is used, firstly, to establish a typology of networks, which results in six types ranging from emotional isolation (the least) to civic-minded (the most connected). Latent transition analysis highlights patterns of network change. Secondly, I use multiple group models ($N = 12,000$) to compare responses to financial factors pre- and post-transition. Findings are mixed. On the one hand, an expansion of personal network reduces the dependence on income for happiness; however, no change is evident in the response to feeling “worse off”. Reasons for these mixed findings are discussed.

Words and networks FRI.AM2

Words and networks FRI.AM2

A Framework for Text-Based Search and Navigation of Social Networks for Non-Experts

David Koelle, Charles River Analytics

Contact: dmkoelle@gmail.com

Today's social network analysis tools provide advanced capabilities that enable experts to analyze and understand the behavior of networks and their constituent entities. Increasingly, non-experts have access to data about network that they can (or should be able to) explore, understand, and leverage (e.g., Facebook, Twitter, LinkedIn). Recently, Facebook released their Graph Search web application which provides a basic version of this type of functionality. Increasingly compelling capabilities for text-based search are sure to arise for users who are not network scientists, but who can benefit from the insights that network science brings to their investigations. Text-based search might let a user ask user-centric questions like, "Who are the best people to follow to learn more about Technology X?" or, "Who among my contacts are emerging as leaders in their careers?" In this presentation, we describe an implementation framework for developing a text-based search capability that incorporates traditional and novel network analysis techniques while providing end-users with an easy-to-use tool for discovering knowledge contained in networks.

Words and networks FRI.AM2

A Network Text Analysis on Chuck Palahniuk's Fight Club

Saba Singh, Carnegie Mellon University Qatar, Starling Hunter

Contact: sabasingh8@gmail.com

Since its publication in 1996, Chuck Palahniuk's best-selling novel Fight Club has been the subject of intense social, political, and literary criticism. So, too, has the film adaptation, released in 1999 and starring Edward Norton as the protagonist. A recent review of over three dozen academic articles on Fight Club reveals the themes of masculine identity, physical violence and fitness, sexuality, self-destructiveness and -improvement, urban life, consumerism, economic and financial power, and popular culture to be among the most frequently investigated. Interestingly, though specific words and phrases from the novel and screenplay are frequently mentioned in critical analyses, I am aware of no studies that have undertaken the systematic content analysis of the text of the novel or the screenplay. In this paper, I apply

Hunter's (forthcoming) morpho-etymological method of network text analysis to analyze Palahniuk's critically-acclaimed screenplay for *Fight Club*. To that end I first use three metrics to identify the most influential or central nodes (concepts) in the network of 385 nodes and 437 statements—constraint, betweenness, and degree centrality. I then map the statements associated with the most influential nodes or concepts back to the aforementioned themes. In short, there is a clear and strong relationships. For example, associated with the 3rd least constrained node we find the words *uppercut* and *sit-ups*, both clearly associated with the physical violence/fitness themes. Statements associated the sixth least constrained node include several that emphasize the business and economic theme—*business card*, *IBM*, *BusinessWeek*, *business trip*, *businesslike*, *businessman*, and *business woman*.

Words and Networks FRI.AM2

A Semantic Network Analysis of Pre-Exposure Prophylaxis (PrEP) on Twitter

Zheng An, University of Southern California, Margaret McLaughlin, Jinghui Hou, Yujung Nam, Chih-Wei Hu, Mina Park, Jingbo Meng

Contact: peaceicean@gmail.com

The U.S. Food and Drug Administration approved emtricitabine/tenofovir disoproxil fumarate (Truvada) as an antiretroviral PrEP to prevent HIV infection in July, 2012. Individuals at high risk of HIV infection need comprehensive and accurate information to effectively implement PrEP. Social media is becoming a popular platform to disseminate health information. A total of 447 English public tweets containing the word "Truvada" were collected between November 15 and December 27, 2012. These tweets were converted to a set of tokens (nodes). A weight (edge) was calculated between two tokens to measure their co-occurrence in 7-word windows. The semantic networks revealed two primary themes, including: (1) Twitter was used to generate discussions and collectively interpret PrEP. This theme was found in highly propagated tweets and in tweets posted by users with more followers. Words with high centrality measures included "HIV" "drug" "prevention" "FDA" "virus" "patient" "learn" "how" "liked" "transmission" "cure" "community" "talk" "discussion" "efficacy" "read" "dose" "PrEP" "medication" and "treatment." (2) Online marketing of prescribed drugs was prevalent. Clusters of words with high centrality measures included "buy" "online" "no" "prescription" "without" "order" "free" "pharmacy" "Internet" "fast" "shipping" "delivery" "Saturday" "purchase" "Fedex" "Cheap" "price" "shop" "brand" "overnight" "paypal" and "cost." Although this theme was found in infrequently propagated tweets and in tweets posted by users with fewer followers, the prevalence raised concerns about purchasing PrEP illegally online and illicit drug abuse. This study makes urgent call for better regulation of online pharmacies.

Words and Networks FRI.AM2

Applying Network Text Methods to the Google Books Corpus: The Cultural History of “Nostalgia”

Monica Lee, University of Chicago, Jonathan Schroeder, Rebekah Baglini, Samuel Meehan

Contact: monicalee@uchicago.edu

There is great excitement in network scholarship over the possibilities of applying network methods to the analysis of complex texts. Most studies apply these methods to relatively small and circumscribed corpuses, while the analysis of large corpuses has been dominated by traditional word-based quantitative content analysis. But how can we apply network-based methods to big and complex qualitative data? What can doing so reveal about the evolution of abstract concepts over time? Using large-scale computation to realize a Foucaultian archeology of knowledge, we investigate the concept of “nostalgia” in the English-speaking world over 200 Years. Using as our corpus 10% of the GoogleBooks library (~3 million books in English), we build ego-centered word co-presence networks for “nostalgia” and investigate changes in these networks over time. We show that until the modernist period, nostalgia designated a pathological, potentially fatal reaction to forced removal from one’s place of birth that chiefly afflicted soldiers, sailors, and slaves. Earlier realist novels “pathologized” the disease of nostalgia by characterizing it as an historical emotion located in populations thought to be tied to place and thus unable to adapt to conditions of increased spatial mobility. Later modernist authors found new, positive value in precisely the characteristics that realism used to constitute nostalgia as a “bad” object by associating this emotion with the emergent category of childhood.

Knowledge and Learning Networks FRI.PM1

Knowledge and Learning Networks FRI.PM1

How Emergent Social Ties Affect Knowledge and Value Transformation in Educational Reform Context?

Wen-Ting Chung, Arizona State University, Yu-Ru Lin

Contact: wen-ting.chung@asu.edu

One of the biggest challenges faced by educational reform is the lack of transformative knowledge infrastructure in existing educational environments. In India, a new Curriculum Framework for Teacher Education was completed in 2009; however, the advocated educational values and practices such as democratic, inclusive, and constructivist learning and instruction, are foreign to the majority of Indian teachers and even to teacher educators. As part of the actions to address this issue, more than hundreds of Indian teacher educators were sent by the India government to the U.S. for a three-month intensive professional training. We take this unique opportunity to study the relationship between social support and knowledge and value transformation, as well as its effect on educational reform progress. This overseas training provides us a natural experiment condition-- it disconnected trainees' original social ties and replaced them with new social settings where people share common objectives. We propose a novel, mixed methods research design that involves panel surveys of the trainees' social networks related to the learning activities, as well as in-depth interviews with the trainees. We hypothesize that trainees who establish new social ties beyond their original socio-cultural boundaries, such as disciplinary expertise and demographic similarity, will develop more profound and practical reform plans, and more persistent in carrying out reform actions. We believe this novel study will contribute to the understanding of how the structure and dynamics of social network affect knowledge and value transformation within educational reform context and will have broad impact on social network methodology.

Knowledge and Learning Networks FRI.PM1

Knowledge Building in a Network: A Social Network Analysis Approach

Amit Chauhan, Florida State University, Vanessa Dennen

Contact: ac11ak@MY.FSU.EDU

Scardamalia (2002) identifies 12 Knowledge Building principles as the creation or modification of real-world knowledge and distinguishes them from internal processes defined as learning.

Real ideas and authentic problems principle is defined as the first principle and is based on learner understanding of real world problems. The principle of Constructive uses of authoritative sources employs inquiry-based learning to support their understanding of concepts whereas Pervasive Knowledge building fosters collective knowledge building. How can these Knowledge Building principles create new knowledge in an online network? How does an actor's position in a network foster this Knowledge Building? This paper will use Social Network Analysis (SNA) to analyse Degree, Betweenness, and Closeness centrality measures in a six week online course. Degree centrality is defined as the number of direct ties in a node whereas Betweenness is the location of the node with important connections to others whereas Closeness connects nodes through shortest paths. The participants were approximately 30 graduate students. The participants were split into two groups based on their second name – Group A (last names A-M) and Group B (last names N-Z). The participants in each group were required to participate and interact with their classmates in a responsive dialogue by replying to discussion prompts. The participants were also required to form case discussion groups related to application of a course topic in real-world settings to build and create new knowledge. Findings from the study can be used for transfer of complex ideas by identifying influential people in a network.

Knowledge and Learning Networks FRI.PM1

Networks of “cabbages and kings”: an exploration of the how conceptual knowledge is connected in the human brain

Kimberly Glasgow, Johns Hopkins University Applied Physics Laboratory

Contact: kimberly.glasgow@jhuapl.edu

As humans, we all use rich, nuanced repertoires of conceptual knowledge to interpret information, make sense of our surroundings, and navigate social contexts. We know what a doctor is, how to eat in a restaurant, and what winter means. Yet how conceptual knowledge is represented in the human brain remains largely uncharted territory. And how such diverse concepts (objects, events, roles, etc.) are connected to each other in our minds is even less well understood, especially when they are embedded in larger meaningful contexts, such as sentences. We conduct a behavioral experiment in which subjects rate the strength of similarity of contextualized stimuli (sentences) to reference concepts. These networks of conceptual similarity are compared to a network based on ratings derived from an automated text processing system. This provides insight into how conceptual knowledge is represented in the brain, and how this differs from the automated approach. This work provides a basis for neuroimaging research to explore how the human brain represents diverse types of conceptual knowledge within spatial and temporal (dynamic) patterns of neural activity.

Knowledge and Learning Networks FRI.PM1

Reconceptualizing Education Organization Leadership as Leading Learning Networks

Eugene Kowch, Professor, University of Calgary

Contact: ekowch@ucalgary.ca

Can network and complexivist thinking expand the possibilities for leading education organization transformation in far-from-equilibrium conditions? This paper presents research findings from several large studies that answer "Yes!" to the question. By using a complexivist organization theory approach (Author, 2008; Uhl-Bein, 2010) and modified policy network frameworks (Author, 2003; 2013), this paper describes and interprets several inter and intra state leader research studies examining how current education leadership theory and practice can evolve toward authentic community and 'transformation' organizations. The argument is a grounded critique of common and convenient education "leadership" theory metaphors and semantics that are falling short for practioners - alongside findings from large statewide and inter-state leadership network studies applying modified policy network concepts to understand issue organization. The findings from several school and university leadership innovation projects are aggregated here to go beyond a disciplinary discussion emerging from business and education journal publications of some of the work- to expand the "space of the possible" at Sunbelt for network leaders and scholars engaged in complex adaptive education organizations facing total system change. Findings include a majority of closed system, linear and bureaucratic thinking shaping as silent, invisible and crippling constraint for the development of 21st century learning organizations in far-from-equilibrium organizational and political states. Finally, we question the determinism of structural functionalist assumptions found that leading steady-state systems or at least leading them toward some (possibly false) state condition and propose new leadership network design principles and specific evidence-based issue organization structures for leaders in changing institutions. Sunbelt offers this scholar a unique chance to learn with others in a quest to move from a (relatively) basic approach to network conceptualizations using UCINET and Sentinel Visualizer to much more. The presentation is of value interest to anyone contemplating deep organization leadership and development praxis or research to create complex, adaptable organizations.

Mixed Methods Studies FRI.PM1

Mixed Methods Studies FRI.PM1

“Traditional” versus “New Economy” Business: Comparing networks in a qualitatively-driven way

Alan Sloane, University College Cork, Seamus O'Reilly

Contact: a.sloane@ucc.ie

We draw on an extensive (n=60) empirical study of small and entrepreneurial businesses operating in two distinct and contrasting sectors of a rural economy. Our interest is both in the practices of these businesses in developing and utilizing their networks, and also in the structure of the resulting networks. Ours is a mixed-methods study, encompassing whole network data collected using name-generators and name-interpreters together with narratives elicited through semi-structured interviews. To arrive at our findings we sought to integrate the methods of SNA and thematic qualitative analysis, and thus to incorporate both an “outside” and an “inside” view of the networks. In order to compare the two networks we draw on ideas from Jennifer Mason about mixing methods in a “qualitatively-driven way”. We adapt several of the “cross-case displays” described by Miles and Huberman in order to compare cases – considered as network-to-network, subgroup-to-subgroup and actor-to-actor.

Mixed Methods Studies FRI.PM1

Describing Spatio-Temporal Group Activities - A Mixed Methods Approach

Rosalyn Negron, University of Massachusetts, Boston, John Tawa, Juergen Pfeffer

Contact: rosalyne.negron@umb.edu

In this presentation, we explore the problem of doing visual analysis of real-time social networks in an online virtual environment. We used a virtual world environment – Second Life – to experimentally test classic sociological theory that suggests that competition for limited resources results in increased social distance between racial groups. Participants created self-resembling avatars and interacted in groups of approximately 20 participants. Using JavaScript and R we created short videos of the spatio-temporal interactions during three different experimental conditions, in order to qualitatively understand the role of racial dynamics in social network formation. Here, we describe the process of generating qualitative descriptions of group dynamics, with special attention to the structures, characteristics, and processes (such as inter-personal and inter-group gravitation and clustering) that can be discovered through

dynamic visualizations. We discuss the use of such qualitative assessments as a precursor to development of formal definitions and algorithmic procedures to model the evolution of real-time groups.

Mixed Methods Studies FRI.PM1

Do perceptions matter more than wealth in status? A potential new approach to evaluate household resource status.

Lucie Clech, Stanford University, Mhairi Gibson, James Jones

Contact: clech@stanford.edu

We propose an alternative method for evaluating resource levels of rural households using an approach similar to the analysis of tournament graphs. While working on out-migration in rural communities in Ethiopia, we were facing the common difficulty of evaluating material and social capital; these forms of capital, and the way they interact, are indeed fundamental for understanding the livelihood strategies of individuals and households. Furthermore, resource perception is expected to be more relevant than absolute wealth for many behavioural decisions. In this community, people are very aware of their status, and are expected to be the best judges of their resource level compared to their community. Data comes from 590 rural households from two agricultural villages visited in 2009. Household heads were interviewed about their material and social resources. Ethnographic, demographic, economic, and relational data were collected. A very simple and short question was added to the questionnaires asking them to cite two other heads of households in their community who they believe are their economic equal. A comparison between graph-based wealth rankings and those based on the usual wealth variables such as land size and herd size is discussed and used here. This simple method brings some interesting insights in terms of behaviour analysis at the community level. It emphasizes the self-perception of the individuals' vulnerability in their community by combining both material and social capital.

Mixed Methods Studies FRI.PM1

Long Distance Relationships create delays in Network Formation

Michael Penta, University of Notre Dame iCeNSA

Contact: mpenta@nd.edu

Based on the cellphone behavior of 196 incoming freshman, students that arrived with a long distant relationship (LDR) experience delayed formation of their personal networks, both in terms of active degree (kappa) and cumulative degree. Difference were maintained for the first

semester and the first year of school, respectively, after which degree patterns reflected the population mean. On examination, it is found that differences in degree levels originates from differences in the formation of ties during the first 3 weeks, a period in which the network is going through a process of rapid formation. Comparison of activity levels of students with or without a LDR only show only minor differences in activity across major interaction categories (Family, Pre-School ties, Post-School Ties, and Unknowns). Instead, it is found that the presence of an LDR-alter represents a significant increase in overall activity, whose individual activity exceeds the total activity of any of the other categories. It is theorized that these differences reflect diminished socializing activity, and that this causes the ego's degree levels to be depressed. Changes in semester to semester routines create the context to allow students to form new relationships and eliminate difference in network characteristics. Gendered differences in interaction are also identified, with males showing significantly less same-sex interaction as compared to female same-sex interaction, when a significant other is present in the network. Comparisons to proximate relationships do not show the same effect on active degree.

Mixed Methods Studies FRI.PM1

Who is who and why bother – Exploring the Determinants of Feedback of Instrumental and Affective Users on Social Network Sites

Ksenia Koroleva, Rotterdam School of Management Erasmus University

Contact: koroleva.ksenia@googlemail.com

As usage of Social Network Sites (SNS) becomes commonplace, people develop their own patterns of communication, depending on the motivations they have for using the platform. In this study we analyze the interactions of users on the Facebook platform and identify the properties of the most active 'friends' providing feedback on the information shared by the user. We believe that network structural properties, such as degree and betweenness centralities, network overlap and tie strength determine the people who provide feedback on the network. However, we go beyond the usual network characteristics and explore the impact of similarity characteristics (gender, age), geographical proximity, and expectation of social capital. In the paper, we adopt a mixed method approach: quantitatively analyze the networks of users and their interactions on the Facebook platform as well as conduct in-depth structured interviews about selected friends in their networks. Results reveal that the determinants of feedback depend on the type of network use. Those who use the network affectively, have on average less friends and higher network overlap, and, among others, obtain most feedback from strong ties which are similar on a variety of demographic characteristics. The instrumental users, in contrast, have more contacts and higher network betweenness and as such, obtain feedback from a wider variety of weak ties in mutual expectations of social capital. These

findings show that by analyzing the feedback that users obtain on the social network, one can imply their motivations for using the platform.

Multilevel Network Analysis FRI.PM1

Multilevel Network Analysis FRI.PM1

A multilevel model of organization and network change

Francesca Pallotti, University of Greenwich (UK) and Universita' della Svizzera italiana (Switzerland), Christoph Stadtfeld, Daniele Mascia, Alessandro Lomi

Contact: f.pallotti@gre.ac.uk

According to one vision organizations are more likely to establish network ties with partners having similar operational experiences (homophily). A second vision suggests that interdependent organizations connected by network ties are more likely to assimilate each other's knowledge and develop progressively more similar portfolios of internal organizational activities (assimilation). Neither vision accounts for processes of differentiation and specialization brought about by the heightened level of mutual awareness that interorganizational networks sustain. In this paper we address this broad concern in a study of interorganizational relations within a regional community of hospitals during the period 2005-2011. We estimate newly developed stochastic actor-oriented models (SAOMs) for multilevel networks which specify how inter-organizational relations affect organizational decisions to change the portfolio of internal organizational activities by adding or abandoning clinical specialties. At the same time, the model allows joint examination of how the common affiliation to internal activities affects decisions to change network ties between partner hospitals. We innovate over existing studies of network dynamics in that we represent processes of change in internal organizational structure, and change in the structure of inter-organizational networks as coupled sub-components of a more general multilevel process of co-evolutionary development. In the discussion of the results we emphasize the connection between recent advances in the specification and estimation of SAOMs for multilevel networks, the current theoretical debates about the emergence of organizations and markets and the interpretation of our findings in the light of rational choice assumptions of the statistical framework.

Multilevel Network Analysis FRI.PM1

A Network Perspective on Migration: Unpacking the Processes of Migrant Social Capital Diffusion

Walker Frahm, University of Washington, Sara Curran

Contact: wfrahm@uw.edu

What role do social networks play in migration? More specifically, how does network structure affect the diffusion of migration over time, and what is the role of central actors in this process? This paper uses multi-level, longitudinal data to address important questions regarding the interplay between social networks and migration. In recent decades, migration scholars have frequently invoked the language of social networks to explain the diffusion of migration experiences. Many scholars have also asserted that differences in the social structures of sending communities can help explain the unevenness of diffusion. By and large, however, these scholars have had to rely on proxy measures and cross-sectional snapshots when conducting social network analyses related to migration. We employ direct, annual measures of social networks in our analysis of migration processes in 22 rural villages from the Nang Rong province of Thailand, from 1984 to 2000. We use comprehensive sibling and marital tie data to determine the precise household-level kinship network for each village at each year of observation. We then use these networks to measure the effect of a village's centralization upon the diffusion of migration experience throughout the community. Household-level centrality measures are also used to determine the extent to which an actor's centrality gives them outsized influence in these diffusion processes. Finally, given the variability of our network across time and space, we explore the possibility that migration, itself, may play a role in disrupting the structure of kinship networks, thereby slowing diffusion processes over time.

Multilevel Network Analysis FRI.PM1

Modelling multilevel network dependencies: an empirical study on the effectiveness of emergency units in a regional health care system

Mark Tranmer, University of Manchester, Francesca Pallotti, Alessandro Lomi

Contact: mark.tranmer@manchester.ac.uk

We explain how the Multiple Membership Multiple Classification (MMMC) model allows us to assess the nature and extent of variations in responses for individual units in a multilevel network. Using such models it is possible to estimate the relative share of variation that may be associated with each level of the network, and also cross-network level variation. We illustrate the empirical value of the MMMC model using data for emergency units (EU) existing within hospitals operating in a regional health care system. More specifically, we analyse variations in the effectiveness of individual EUs while taking into account both the multilevel network structure in which they are embedded, as well as characteristics of the hospitals containing them. We measure EU effectiveness in terms of the speed and accuracy of treatment provided to emergency patients. In our model, EU effectiveness is affected by characteristics of the EU itself and by organizational characteristics of the hospitals in which the EU is contained. Multilevel network dependencies are generated by patient transfer relations observed between EUs

(emergency transfers), between hospitals (elective transfer), and between EUs and hospitals (cross-level transfers).

Multilevel Network Analysis FRI.PM1

Performance and network position: a social influence analysis with multilevel ALAAMs

Peng Wang, Melbourne School of Psychological Sciences, The University of Melbourne., Garry Robins, Philippa Pattison, Emmanuel Lazega

Contact: pwang@unimelb.edu.au

Auto-logistic actor attribute models (ALAAMs), as extensions to exponential random graph models (ERGMs), associate nodal attributes with network structures, and model social influence process as a result of both individuals' attributes and their network positions (Robins and Pattison, 2001; Daraganova and Robins, 2013). To date, most studies using ALAAMs are limited to the analysis of nondirected one mode networks (Daraganova et al., 2013). Wang et al (2013) highlighted how networks of different levels may affect one another by applying ERGMs in a multilevel network context. In this paper, we extend ALAAMs to directed, bipartite and multilevel networks to test how multilevel network structure may affect nodal attributes. We apply multilevel ALAAMs on the dataset of the French cancer research elites and their affiliated laboratories (Lazega et al. 2006; 2008) to see the association between multilevel network positions and the research performance of both researchers and laboratories. Such models may reveal the network strategies by researchers and laboratories in achieving high performance. We compare ALAAMs for within level networks and the overall multilevel networks. Such comparison demonstrates the difference in interpretations and the importance of including the complete multilevel network structure in inference on within level social influence processes. We see this approach as another step towards full elaboration of statistical modelling of multilevel networks.

Multilevel Network Analysis FRI.PM1

Hierarchical Network Models

Tracy Sweet, University of Maryland

Contact: tsweet@umd.edu

Current methods of social network analysis are ill-suited to model the multiple partially-exchangeable networks that arise in randomized field trials and observational studies in which multiple classrooms, schools, or districts are involved. To address these needs and drawing from the statistics literature on single network statistical models, I introduce a new

organizational framework, Hierarchical Network Models (HNM). HNMs can be used to extend single-network statistical network models to multiple networks, using a hierarchical modeling approach and allow one to not only model ensembles of networks from observational data but also fit network level interventions. The HNM framework is quite flexible in that any statistical network model can be used; I introduce two families of models as examples, the Hierarchical Latent Space Model (HLSM) and the Hierarchical Mixed Membership Stochastic Blockmodel (HMMSBM). To illustrate feasibility, I present two empirical examples. First, I apply the HLSM to both real-world network data and compare parameter estimates from the HLSM fit with separate latent space model fits. Then I use simulated intervention data to demonstrate how one could use the HLSM to estimate treatment effects as well as to illustrate parameter recovery.

Network Dynamics FRI.PM1

Network Dynamics FRI.PM1

Dynamic patterns analysis meets Social Network Analysis in the modeling of financial market behavior

Caterina Liberati, University Milano-Bicocca, Paola Zappa

Contact: caterina.liberati@unimib.it

Social Network Analysis has been widely applied to detect drivers of counterparty selection in several inter-individual and inter-organizational settings. Several longitudinal methods have been proposed to identify the evolution of actors' behavior and positioning within a network of relationships. These methods provide a detailed description of the general tendencies shaping the network, but do not allow to isolate groups of similar behaviors. Standard cluster analysis has been used to accomplish this purpose, but with a main focus on cross-sectional data. We propose to combine Social Network Analysis with Multi-way Factor Analysis in order to represent the evolution of actors' behaviors according to the time structure of data and to facilitate the visual inspection of actors' trajectories onto the compromise plan. Using ego-network measures referred to various definitions of social capital, we derive a linear combination of multiple factors. They are represented on a compromise space, which can be seen as the space spanned by the factors and can be conceived as a "virtual" space where actors route paths can be drawn. We, then, cluster trajectories so as to identify similar patterns and to provide an interpretable solution coherent with the data. Original data on the activity of the Euro Electronic Market for Interbank Deposits are used to detect the dynamics of similar lending behaviors of EU banks during the recent turmoil period. Insights into the rationale and benefits of the proposed approach are provided.

Network Dynamics FRI.PM1

Personal Network Dynamics, Gender, and Career Trajectories in Academic Science and Engineering

Michael Siciliano, University of Illinois at Chicago, Eric Welch

Contact: michael_d_siciliano@yahoo.com

The underrepresentation of women in academic science has been recognized to be a significant national policy crisis and "waste" of human capital (NAS, 2007). Moreover, "...differences in career trajectories for men and women are generated and reinforced by the social structures in

which people are situated and by the networks of interactions in which they participate" (NAS, 2006; p. 174). How and why men's and women's networks change over time may provide insights into different types of professional outcomes that may explain disparities between genders. We collected two waves of survey and ego-network data from a national sample of 765 academic scientists and engineers across six disciplines at Research I universities in the United States. Our study utilizes a dynamic perspective on the changes in a scientist's personal network by analyzing churn in network composition and structural patterns. We examine individual, institutional, and relational factors associated with the persistence and dissolution of network ties over time. We then link measures of network churn to objective indicators of performance. Specifically, we look at how changes in the structure and composition of a scientist's professional network affect his or her (i) number of grant submissions, (ii) grant success rate, and (iii) number of publications. Findings suggest that individual, institutional, and social resources differentially affect network churn for, as well as the success of, women in STEM fields. The results have implications for how academic institutions can best provide mentoring relationships and support for women scholars.

Network Dynamics FRI.PM1

Social Resources and Employee Engagement: Moderator Effect of Age.

Martijn Jungst, Maastricht University School of Business and Economics Tongersestraat 53, 6211 LM Maastricht, The Netherlands, Hetty Van Emmerik, Boris Blumberg

Contact: m.jungst@maastrichtuniversity.nl

In alignment with the increasing retirement age across Europe and North-America, scholars have started to place new attention on ways to enhance and sustain work motivation among older workers (Avery, McKay, & Wilson, 2007; Kanfer & Ackerman, 2004). In the present study, we will examine how social resources embedded in social networks (i.e., expressive and instrumental resources (Lin, 2002)) are associated with employee engagement across different ages. We depart from a life span model (Baltes & Dickson, 2001), to argue that age can be expected to affect how these resources may translate into employee engagement (i.e., employees' persistent and pervasive condition characterized by vigor, dedication, and absorption (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004)). Weekly diary data gathered over the course of five weeks from 172 individuals participating in adult education are analyzed with a hierarchical liner modeling approach. The results show that weekly fluctuations in expressive and instrumental resources positively affect employee engagement, so that individuals will report higher levels of engagement in periods when they have more resources compared to periods when they have less resources within their social networks. We also found that age moderates the intra-individual relationship between expressive resources and engagement, so that older individuals benefited more from social networks including expressive resources. This study makes several important contributions. First, we examine an

intra-individual model linking two social resources to employee engagement and show that older individuals have higher levels of engagement in periods when they have access to expressive social resource within their social networks. Second, enhancing our understanding of work motivation among older workers might be helpful for HRM professionals or managers in creating and implementing HRM practices stimulating employee engagement.

Network Dynamics FRI.PM1

Stochastic actor-oriented models for the joint dynamics of one and two-mode networks:
Analytical extensions and empirical tests

Alessandro Lomi, Università della Svizzera italiana - Lugano, Christoph Stadtfeld, Tom Snijders

Contact: alessandro.lomi@usi.ch

We contribute to the further development of Stochastic Actor Oriented Models (SAOM) by extending the model recently proposed by Snijders, Lomi and Torló to analyze the joint dynamics of one and two mode-networks (Social Networks, 213, 35: 265–276). More specifically, we pursue the following objectives: (i) Define a behavioral objective function that can be associated to the row-elements (typically, representing “agents”) of 2-mode networks; (ii) Include in the behavioral objective function the effects of common association with the column elements (typically representing “contexts,” “resources,” “activities,” or “foci”), and (iii) Include in the behavioral objective function the effects corresponding to exogenous characteristics of the column elements. These new functionalities may be important for analyzing the joint evolutionary dynamics of 1- and 2-mode networks. They are new additions to the repertoire available in the RSiena package. We provide an empirical illustration of the model extensions in the context of data that we have collected on processes of network and organizational change in a community of hospital organizations connected by collaborative patient sharing relations. The discussion emphasizes the relation between the model extensions that we propose, and positional mechanisms of tie formation and maintenance that SAOMs may help to clarify.

Network Dynamics FRI.PM1

Multilevel analysis of network dynamics: Bayesian and frequentist approaches

Tom Snijders, University of Oxford University of Groningen, Johan Koskinen

Contact: tom.snijders@nuffield.ox.ac.uk

Multilevel longitudinal network data sets, by which we mean longitudinal network data sets that were collected according to the same design in multiple, disconnected groups, are starting to be available more and more. This offers new possibilities for generalization and requires new

methods of analysis. In a hierarchical model for such data structures, there are two sets of parameters: parameters at the highest level, the population of groups, which may be called the population parameters; and parameters at the group (or network) level, determining the network dynamics in each group. We specify a multivariate normal distribution for the distribution of the group-level parameters conditional on the population parameters. Conditional on the population parameters, inference about group-level parameters may be based on standard likelihood-based techniques. For the joint analysis of group- and population-level, we consider a fully Bayesian approach whereby the latter are treated as parameters with priors; and an empirical Bayes variant where the population parameters are estimated by maximum likelihood. This method has been for some time experimentally available in the function `sienaBayes()` of the `RSienaTest` package. We report on an extension of the method where it is possible to let only some of the group-level parameters vary across groups; and on the comparison between the fully Bayesian and the empirical Bayes approach.

Network Mechanisms and Network Evolution FRI.PM1

Network Mechanisms and Network Evolution FRI.PM1

A Bipartite Network Approach for the Analysis of Social Networks on Online Communities

Spyros Angelopoulos, Horizon Digital Economy Research Institute University of Nottingham, UK, Yasmin Merali

Contact: Spyros.Angelopoulos@nottingham.ac.uk

Discussions among participants of online communities are social interactions, representing antecedents for the formation of network ties. Literature to date has concentrated on reply-networks and quote-networks to study their emergence and evolution. In these approaches, two participants are considered related to each other if they have replied on the same thread of a third participant, or have quoted the posts of each other, respectively. These approaches however, inherit the limitations imposed by the respective behaviours: spatial, temporal, and contextual proximity factors increase the likelihood that two participants will reply to each other, while usability and internet literacy factors increase the likelihood that some participants will use quotes more than others. To overcome the limitations imposed by the aforementioned approaches, this paper presents a novel methodological approach for analysing the evolution of networks among participants of online communities, based on bipartite networks: the threads represent the network events and the participants the actors. This approach provides a longitudinal lens to bipartite network analysis, as actors of the network can participate simultaneously to multiple events over time, remaining participants of the previous events while they participate to new ones. By using data collected from an invitation-only online community of elite cigar smokers for a period of eighteen months, the paper introduces a novel approach of analysing the emergence and evolution of these networks, and therefore contributes to the stream of research on networks on online communities, and to the overall network science literature, by providing a longitudinal approach to bipartite network analysis.

Network Mechanisms and Network Evolution FRI.PM1

Evolution of Biotechnology Cluster's Network: How Homophily and Prior Structure affect Formation of Technology Connections in Boston and San Diego

Zhangbo Yang, Shool of Management, Xi'an Jiaotong University, China, Shanxing Gao, Ying Li

Contact: axins1986@gmail.com

This research considers how biotechnology industrial clusters evolve and what factors affect this evolution from a technology network perspective. Few studies focus on how clusters

develop over time, especially in a network perspective. On the other hand, current studies on network evolution mainly focus on similarity of individuals rather than homophily of organizations. In this research, we contribute to cluster theory through introducing a social network method and theory. We analyze evolution of cluster's network from two perspectives: technology homophily, measured by technology and organizational similarity, and prior structure. We use pagerank to measure the importance of patents (technologies as sources), and structural holes to measure the ability of technology diffusion (technologies as conduits) in prior structure. Networks of technology connections are indicated by medical patent citations in Boston and San Diego from 1976 to 2006. The results indicate the development of biotechnology clusters presents a significant heterogeneity agglomeration and biotechnology development is based on complementary technology. We also find that technologies with high capacity of diffusion play key roles in network evolution. In addition, we use visualization techniques to describe our findings.

Network Mechanisms and Network Evolution FRI.PM1

How triadic embedded changes in alter's perceived performance influences affective relationships

Charles Kirschbaum, Insper Institute of Education and Research

Contact: charlesk1@insper.edu.br

In recent years, an increasing volume of studies has approached longitudinal-based models in order to grasp how social networks evolve (e.g. Snijders, 2011). Recent models have been successful in incorporating the triadic effect in tie formation and disruption. In tandem, extant research has attempted to expand how we conceive social relations, including, inter alia, interpersonal affect. As a result, new studies have shown the dynamic relationship in multiplex settings over time. Within this research we contribute to this line of research exploring how the perception of alter's performance coevolves vis-à-vis affective relations. Further, we introduce promotions as a way of understanding how changes in the formal structure impact the informal dynamics. Our empirical setting covers three waves within an Investment Bank in Sao Paulo, covering in total 53 respondents at each wave, where 47 were observed in all of them. Beyond and above traditional triadic one-mode controlling variables, we found that the promotion of well-liked and same status alters impact negatively over ego-alter affect. Further, at a shared incoming triad (perceived performance), when high status alter reciprocates the low status alter (120C), or ego reciprocates low status alter (120U), this impacts negatively on ego-high-status alter's affective relationship. We suggest a framework that encompasses these findings, emphasizing the formal-informal dynamics influencing the multiplex triadic equilibrium.

Network Mechanisms and Network Evolution FRI.PM1

The Evolution of Networks with Two Conflicting Forces

Poong Oh, University of Southern California, Peter Monge

Contact: poongoh@usc.edu

A network is said to be modular if groups of nodes in the network are tightly connected to one another within their groups but relatively disconnected to the others. Previous research has found that modular networks, more generally, nearly-decomposable systems, abound because of their evolutionary advantages: the likelihood that a complex performance is completed in an environment subject to random shocks is higher when stable subcomponents exist, as in a modular network (Simon, 1962). Thus, a network with a high modularity is beneficial to every node in it. For this reason, networks tend to grow more modular. On the other hands, it is also known that individual nodes that bridge separate clusters have an advantage to have access to diverse resources. The advantage of a node is estimated by the non-redundancy among the clusters that it bridges (Burt, 1992). As a corollary, this implies that “rational” individual nodes are expected to bridge the least overlapping clusters to maximize the benefit from their location in the network (i.e., structural holes). However, bridging non-overlapping clusters decreases the modularity of the network and consequently reduces the potential benefit to every other node in the network. This study proposes a theoretical framework in which the dynamics between the two conflicting forces is conceptualized as a special kind of public goods dilemma and develops an agent-based model. A series of simulations suggest that marginal cost for tie-formation, marginal utility of modularity, and structural inertia (i.e., response time) are key determinants of network structures.

Network Mechanisms and Network Evolution FRI.PM1

Using Squared Coherencies to Examine Network Evolution and Co-evolution

George Barnett, University of California, Davis, Jesse Hammond

Contact: gbarnett@ucdavis.edu

This paper explores the use of spectral analysis to examine network evolution and co-evolution. Given a sufficient number of measurements of a valued network over time, a matrix (K) may be created, where k_{ij} is the squared coherencies between nodes i and j . Matrix K is symmetric ($k_{2ij} = k_{2ji}$) and its diagonal, $k_{2ii} = 1$. Since K is a matrix of relations, it may be analyzed like any other network to determine which nodes co-evolve, and which change independently. To illustrate this approach, cross-spectral analyzes were conducted among 250 pairs of nation-states based on terrorism news coverage to create matrix K . Then, a network analysis was

conducted. Exogenous variables may be included in the analysis. For example, the relationship (κ_{2ix}) between the number of terrorist events and the coverage of each country may be included in matrix K^* , where x is a vector of squared coherences allowing the determination of which states' evolution corresponds with terrorist events. Future research will empirically examine network co-evolution. The co-evolution of two networks with the same nodes and equivalent time frames may be similarly examined. Consider supra-matrix K^{**} , composed of two minors K_1 and K_2 , composed of the square coherencies for each individual network, and two minor matrices K_{12} and K_{21} , composed of the squared coherencies between the corresponding cells of K_1 and K_2 . Where there is no phase shift, $K_{12} = K_{21}$. Where a time lag between the networks exists, $K_{12} \neq K_{21}$. Since K^{**} is a matrix of relations, a network analysis may determine how the nodes from K_1 co-evolve with those from K_2 , and which change independently. Time lags between K_1 and K_2 may be inserted in K^{**} to ascertain causality.

Networks and Culture FRI.PM1

Networks and Culture FRI.PM1

Defining the Elite in Roman Egypt

Yanne Broux, Research Foundation - Flanders (FWO) / KU Leuven

Contact: yanne.broux@arts.kuleuven

The project 'Defining the Elite in Roman Egypt' focuses on the two 'orders' created under emperor Augustus: the metropolitans and 'those of the gymnasium'. These orders have always been treated as a homogenous group of equals, which in a legal sense they were. Documents show, however, that the social, economic, cultural and political backgrounds of their members were in fact very diverse. This project will therefore uncover not only how these two orders related to each other, but also the dynamics between them and the socially superior Greek and Roman citizens. The database Trismegistos (www.trismegistos.org), which collects almost half a million attestations of persons in Graeco-Egyptian texts between 800 BC and AD 800, will serve as a starting point. With the help of titles and status designations, members of the orders are singled out to create a prosopography. Then, thanks to the database's two-mode people-in texts structure, one-mode people-to-people networks of the orders' members can easily be created. Subjecting them to network analysis will hopefully contribute to our understanding of the orders' composition, their geographical range, the economic position of their members, etc. At the same time, this can help answer vital questions concerning chronological evolutions: not only regarding the orders as a whole (e.g. did the grant of universal Roman citizenship in AD 212 cause their decline?), but also in respect to individuals aspiring to upward social mobility. In turn, this bottom-up approach can help us understand how the Roman government integrated local networks into the empire.

Networks and Culture FRI.PM1

The network origin of plural identities: structural brokerage, diversity and cultural holes in international immigrants' networks

Raffaele Vacca, University of Florida, Tommaso Vitale

Contact: r.vacca@ufl.edu

What creates closed identities? Is there a network effect to plural identities and cultural adaptation? We explore these questions using personal network data on international migrants in Barcelona, Spain, and Milan, Italy. We show that both structural brokerage and

compositional diversity in personal networks, and the interplay between them, matter to ethnic identity and cultural adaptation among immigrants. Existing research suggests that multiple and fluid identities are facilitated by weak ties and simplex, uni-dimensional relations within single spheres of sociability. We show that weak simplex ties prevail in sparse personal networks, where Ego is a structural broker among multiple and separate social circles. On the other hand, strong multiplex ties prevail in dense networks that are centred on large tightly-knit cores. The former network structure fosters multiple, weak identities and cultural adaptivity; whereas the latter is associated to single, stronger identities. However, structural brokerage is only relevant to identity and adaptation when Ego brokers between differences. More precisely, Ego must broker between groups that are internally homogenous, and different from each other, with respect to culturally relevant attributes. In other words, attributes must be segregated, rather than mixed, in network subgroups. We discuss this result using the notion of “cultural holes”: networks where the migrant bridges culturally different and internally homogeneous subgroups are more likely to imply cultural holes, weak identities and cultural adaptation. We aim to provide a relational explanation of plural identities and cultural adaptivity, moving beyond the simple traditional framework of process-based identities.

Networks and Culture FRI.PM1

The Situational Foundation of Networks: An Investigation of the Emergence and Diffusion of Culture

Christian Stegbauer, Goethe-University Fachbereich Gesellschaftswissenschaften Institut für Soziologie

Contact: stegbauer@soz.uni-frankfurt.de

This paper investigates situations as a foundation of networks and culture. In an experiment a small segment of the invention and diffusion of culture is examined. Situations are the basic elements of the process of the emergence of culture and network relations. This was the idea for conducting experiments to observe the process of emerging structure and culture. The experiment is a wine-tasting situation in which three persons are brought together. The experiment is divided in two parts: an initial situation with strangers and a follow-up situation with the same people. The experiment shows not only the alignment of behavior in social situations, it also unveils the persistence of behavior in a follow-up situation. The observation can show how cultural elements can be exchanged by different situations. This is the case when some of the elements introduced and negotiated in a situation persist from the first to the second situation. When culture begins at the level of situations, an analysis of this level can explain differences in behavior, interpretations and meanings, which are measured in network analysis.

Networks and Culture FRI.PM1

Social embeddedness of a rural credit market in the 19th Century

Martin Stark, University of Hamburg

Contact: martinstark1@gmx.de

This paper presents the results of my completed PhD research project on the social embeddedness of a rural credit market in the 19th Century. The main goal of the research was to find out if the social embeddedness of actors had a measurable positive or negative effect on their performance within a historical credit market. The example case is the rural credit market of the village of Ohmenhausen, close to Reutlingen in the Kingdom of Wuerttemberg in Southwestern Germany. The data was extracted from mortgage books, wealth inventories, tax lists and the church registers of the village. In accordance with New Institutional Economics I consider credit markets as social networks of debtors and creditors. In this two-mode network the actors are connected via credit relations. The social embeddedness of the villagers is operationalized by (re-)constructing the kinship networks inside Ohmenhausen. The actors in the kinship networks are all households which paid real estate taxes. These households owned land and were therefore able to raise mortgages. The research is conducted by comparing the distributions of credits inside the kinship networks for the sample years of 1825 and 1850. In 1830 mortgage laws underwent significant reform. I therefore compared one year before and one year after the reform in order to isolate the effect of the reform on the market structure and ask how the reform has changed the distributions of credits within kinship networks.

Networks and Culture FRI.PM1

The Social Networks of Alexander the Great and Pericles

Diane Cline, George Washington University

Contact: dianehcline@gmail.com

I have been experimenting with Social Network Analysis using NodeXL to study the social relationships of Pericles, Philip II, and Alexander the Great. This paper demonstrates the application of Social Network Analysis (SNA) to ancient history. I have published one article last year on the Social Network of Alexander in the *Ancient History Bulletin* and am working on Pericles currently. I believe I may be the only researcher using SNA for ancient biography. The visualizations are particularly valuable for helping scholars ask new questions and discover topics to study, presenting data that has been analyzed in every generation since the Renaissance times in fresh ways. My conclusion is that SNA is not an end in itself but a tool for noticing patterns that might not be evident from a linear reading of ancient sources in text form.

Two images uploaded: Below: Social Network of Pericles, 5th c. BC Athenian statesman and general. Below: Alexander's relationships with people from different ethnic groups of his empire, 323 BC.

Networks and Natural Resource Management FRI.PM1

Networks and Natural Resource Management FRI.PM1

Applying an Overlapping Networks Approach to Understand an Environmental Learning Landscape

Deb Wojcik, Stanford University, Nicole Ardoin, Kathayoon Khalil

Contact: dwojcik@stanford.edu

We employed a mixed-method, multiple-stage approach to explore the diverse and plentiful environmental learning opportunities and networks present in the greater San Francisco Bay Area. Specifically, we investigated how organizations and institutions may have overlapping interests related to environmental learning and be working together to accomplish their respective missions. This study is intended to illuminate environmental learning in a broad sense, by addressing not only organizations that self-identify as focused on environmental issues, but also organizations that provide environmental learning opportunities whether or not this is their primary mission—e.g., community health providers, online communities related to alternative transportation, and parenting groups, among others. Given this intention and our inability to know all potential environmental learning providers a priori, we asked organizational representatives to name their top collaborators, without predefining the boundaries of this network. We then identified overlaps among the organizations named, using self-reported and cognitive social structure data, to estimate the broader environmental learning landscape. This study was conducted in four phases. First, potential respondents were identified through a field scan of environmental learning providers. We then asked organizational leaders to respond to an online survey, in which they named their top collaborators and reflected on their relationships with and among the organizations they named. From this egocentric/personal network data, we created an overlapping network that encompassed pre-identified and named organizations. Finally, we used network visualizations and statistics as a springboard for collecting qualitative data from members of the environmental learning community.

Networks and Natural Resource Management FRI.PM1

Conversation dynamics and change in mental models: an analysis of the UC Davis Adaptive Rangeland Management study

Lorien Jasny, University of Maryland

Contact: ljasnys@sesync.org

This project combines networks of mental models and conversation dynamics to understand collaboration and deliberation in a small group. We brought interested stakeholders (ranchers, conservationists, and government rangeland managers) to visit a piece of UC Davis rangeland. They were to decide how to manage the property, and their decisions will be carried out. Prior to group discussion, we surveyed 4 groups of respondents (a homogenous group from each category of ranchers, conservationists, and government rangeland managers as well as one mixed group) about the management decisions they would make. In particular, we were interested in how these respondents linked the methods they would use to the goals they set. We thus have bipartite networks for each individual respondent where the tie indicates that a given method should be used to achieve a given goal. We also recorded the group discussions and obtained timed sequence data for the order and duration of speaking. After the group discussion, we then asked each individual to make any changes they felt were appropriate to their network of responses about goals and methods that they had given before discussion. This paper compares how their responses changed to their position in the discussion network.

Networks and Natural Resource Management FRI.PM1

Powerful or powerless? Conflict and cooperation – possibilities and impossibilities in coastal zone management: a social network analysis

Friederike Lempe, Institute of Baltic Sea Fisheries, Rostock
, Harry Strehlow, Jennifer Hauck

Contact: friederike.lempe@ti.bund.de

The diversity of interests regarding the use and the protection of coastal resources and the further degradation of aquatic habitats in the estuaries and lagoons of the Southern Baltic require an evaluation of current management practices. A total of 35 semi-structured expert interviews with state and non-state actors coming from fishery, nature conservation, agriculture, science and spatial planning were realized to identify central actors within the governance network. Respondents were asked to evaluate their own bargaining position in the network. Under discourse analytical considerations, we analysed individual perceived power asymmetries between different stakeholder groups. These results were compared with social network data. Preliminary results indicate that there are partially huge discrepancies between the self- and outside perception of different stakeholders concerning their influence. Additionally the network map visualizes central actors and reveals “bottlenecks” and “supporters” of a sustainable coastal zone management. The discourse seems to be highly polemic and characterized by irreconcilable interest antagonisms. Several stakeholders feel disadvantaged and marginalized preventing meaningful cooperation. This raises the question of how from a stakeholders perspective criteria like efficiency, legitimacy and participation might be integrated into future policy-making processes. The network maps will be used to

create awareness among the most influential actors regarding coastal resources to achieve better collaboration for an effective management. The paper increases the understanding of the factors that impede or facilitate sustainable coastal resource governance and provides an insight into the engagement and importance of stakeholders in the policy-making process.

Networks and Natural Resource Management FRI.PM1

Role of Social Networks in Collaborative Water Management

Pranietha Mudliar, School of Environment and Natural Resources, The Ohio State University

Contact: mudliar.1@osu.edu

Social networks have recently been identified as a key feature that may facilitate or obstruct collaborative efforts for natural resource management (Codin and Brona, 2006; Bodin and Prell, 2011). Social networks provide resources and information that is necessary for effective collaborative natural resource management (Carlsson and Sandstrom, 2008). Studies on social networks indicate that individuals interact with other individuals with whom they share similar attributes such as race and ethnic diversity, which creates homophilous relations (McPherson et al, 2001). However, the effect of social networks on collaborative water management is not clear. Moreover, the effect of class, race, and gender on social networks and how it influences collaborative water management has not been studied. In this study, I investigate the network structure of two collaborative water management organizations in West Virginia and Ohio to characterize the effect of network homophily, bonding, bridging, and cross-scale linkages on collaborative water management. Bonding ties, bridging ties, and cross-scale linkages create trust, reciprocity, and provide financial, scientific, and technical resources to organizations that aid collaborative efforts. I will measure network position i.e. the degree centrality of the actors and the number of ties an actor possesses, structural equivalence, and identify different kinds of ties in the network. In this study, I aim to analyze network structures and its implications for collaborative water management. Preliminary findings of one network in West Virginia indicate a tightly close-knit network with a core-periphery structure.

Networks and Natural Resource Management FRI.PM1

Governing landscapes through networks of partnerships: Lessons from Amboseli, Kenya

TABITHA MUGO, PhD candidate, Wageningen University, The Netherlands & Lecture, Moi University, Kenya, Rene van der Duim, Ingrid Visseren-Hamakers, Damiannah Kieti

Contact: tabitha.mugo@wur.nl

This paper studies Amboseli ecosystem from a landscape governance perspective. First, we discuss the ecosystem as a landscape, and examine the relationship between the social production and the natural-spatial conditions of Amboseli a socially and culturally constructed and reconstructed. Second, we argue that landscapes are governed by multiple actors, with diverging interests, who are involved in complex social networks transcending physical landscape boundaries. This multi-actor, multi-interest, and multi-scale complexity raises concerns about how the scales are constituted, how decision-making occurs within and between scales, and how the scales relate with each other. Third we claim that partnerships can play a unique role in landscape governance, since they represent places of decision-making where diverse actors, each with their own multi-level social networks meet. Partnerships can thus be regarded as a place for inter-network interactions, where different conceptualizations and practices of a landscape potentially converge. Since partnerships also interact with each other, and form networks of partnerships, this paper studies the roles of partnerships and networks of partnerships in landscape governance. We apply landscape governance approach to the Kenyan Amboseli landscape. The paper focuses on the Amboseli Ecosystem Trust, a partnership aimed at combining actors' efforts in steering conservation and development in the Amboseli landscape. The social networks within and of the partnership will be analyzed to understand how various actors conceptualize and practice the landscape, how these conceptualizations and practices are influenced by networks that their actors are part of, and how these conceptualizations and practices influence governance of Amboseli landscape.

Words and Networks FRI.PM1

Words and networks FRI.PM1

Visualizing Sociosemantic Networks

Nikita Basov, Center for German and European Studies (St. Petersburg State University - Bielefeld University)
, Wouter de Nooy

Contact: n.basov@spbu.ru

The paper explores possible methods to visualize sociosemantic data, with information about ties between concepts and between actors within respective one-mode networks and also information about ties between these sets (or modes) – in a single visualisation. One possibility we use is a 3D visualization, where distances within a set of vertices reflect the extent to which these vertices resemble each other as they have stronger links to the same vertices in the other set, while the distances between a concept and an actor reflect the extent to which a (two-mode) pair is part of a (larger) cluster of vertices in both modes that are directly connected. We test this method on a generated network and expect it to allow analysis of structures with many actors visually grasping 2-mode sociosemantic (sub)groups in co-evolving networks of actors and concepts. Yet within subgroups with smaller numbers of actors similar in their semantic structures, 2D layout appears more useful. We apply Pivot MDS to visualize sociosemantic networks in 2D and use the data on St. Petersburg creative communities to explore the opportunities of this method analyzing how conceptual networks, networks of actors, and 2-mode networks between actors and concepts are related within groupings. The visualization demonstrates how concept-sharing is related to communicative positions of actors who use them; it allows to locate knowledge creators, compare their significance in defining the concepts used by a (sub)group and trace how ‘semantic collaborations’ between these actors are relevant.

Words and networks FRI.PM1

Conceptual Structure of Sustainability: Social and Scholarly Perspectives

Dmitry Zinoviev, Suffolk University, Zhen Zhu

Contact: dzinoviev@gmail.com

Though the topic of sustainability has attracted substantial interest among both academic and civil communities in the last decade, its concept and scope are often defined arbitrarily. Sustainability may refer to global warming, reconciliation of environment, social justice, vegetarianism, simple living, etc. The goal of this research is to define a more universal and

holistic view of the concept of sustainability. We achieve this goal by analyzing the perceived meaning of the word “sustainability” and its use by general population in social media and by scholars in academic publications. Our findings are based on processing data from two sources: on the one hand, 300 sustainability-related online communities hosted by LiveJournal blogging site, with 72,000 bloggers participating in these communities; on the other hand, 7,500 sustainability-related journal papers, written by 16,000 authors and found in the EBSCO database (both data sets collected over the past decade). For each data set, we analyzed a complete list of code words, such as self-declared interests, author-supplied keywords, and subject tags. The code words were arranged into semantic networks, based on perceptual similarity, and organized into semantic clusters representing various aspects of sustainability. We observed a major difference between the structures of sustainability from the standpoints of social and academic players. However, despite differing in addressing urbanization, agriculture, education, health, nutrition, and social issues, the structures have a common backbone pertaining to ecology, environmentalism, and globalization. The holistic “many-in-one” concept of sustainability is explained in detail in the paper.

Words and Networks FRI.PM1

Market Player or Regulator? A Semantic Network Analysis of the Shifting Roles of the ECB During the Financial Crisis.

Adina Nerghes, Vrije Universiteit Amsterdam, Peter Groenewegen

Contact: adina.nerghes@vu.nl

Organizations such as the European Central Bank (ECB) are part of multiple institutional fields (recognized areas of institutional life) in a complex inter-institutional system. In times of societal crisis, such organizations are influenced by their context in multiple social locations. Thus, their institutional logics (i.e., the frames of reference that form actors’ choices for sense-making, the vocabulary they use to stimulate action and their sense of identity) are impacted by these different institutional fields. Institutional fields enact institutional logics, which stem from institutional orders (i.e. capitalism, state bureaucracy, and political democracy). Each of these institutional orders has a central logic that guides its organizing principles and they characterize the different types of institutional fields that influence organizations. Using ‘inter-institutional system ideal types’ to demarcate the different institutional orders, this paper investigates the dominant institutional field discourse employed by the ECB at various stages of the recent financial crisis. Employing semantic network analysis, we focus on the press releases of the ECB at three different time points: before the financial crisis, during the crisis, and post-crisis. Specifically, we highlight structural roles based on combined centrality measures to expose discursive trends. Our results confer strong shifts in the discursive practices of the ECB for each of the periods analyzed, exposing redesigned or adapted institutional logics in the post-crisis

period, where the ECB's discursive practices are indicative of a transformation toward a new condition, that of an intervention-oriented actor of the financial market.

Words and Networks FRI.PM1

On the Importance of Isolates in Text Networks

Katja Mayer, University of Vienna, Juergen Pfeffer

Contact: katja.mayer@univie.ac.at

In network analysis we are commonly interested in central nodes, groups and bridges while isolated nodes and very small components are ignored. In addition, many small components and isolates are often algorithmically troublesome in the analysis process. As a result, the analytical focus is on larger components or core networks, and everything else gets removed from the network-perspective. However, when analyzing text networks extracted from scientific research proposals, isolates and small components can indicate interesting contextual features and support the study of emerging research areas. Here, we analyze more than 750 abstracts of Social Science and Humanities projects funded by the European Research Council from 2007 to 2013 with a mixed method approach. We are exploring different socio-semantic network patterns in regard to isolates and small components and show what we can learn from this focus on the periphery or marginalized entities. How distant does an n-gram or document have to be as to be referred to as isolate in a topical landscape? How could we investigate "research frontiers" or "risky research" by sidestepping traditional bibliometric or knowledge diffusion approaches?

Words and Networks FRI.PM1

Socio-Semantic Network Analysis for Impact Assessment of Documentaries

Jana Diesner, University of Illinois Urbana Champaign, Jinseok Kim, Susie Pak

Contact: jdiesner@illinois.edu

Besides telling a story, the goal with social justice documentaries is to motivate change in people's knowledge and/ or behavior. How can we know if a production has achieved these goals, and how early in the life cycle of a film project can we answer this question? The need for reliable, efficient and systematic ways to evaluate the impact of such media productions has been repeatedly pointed out by funders, practitioners and researchers. We report on how we have been addressing this need by developing, implementing, applying and evaluating a theoretically-grounded, computational solution for assessing the impact of social justice documentaries in a scalable, empirical and comprehensive fashion. Based on the assumption

that documentaries are produced and watched as part of larger and continuously changing ecosystems that involve multiple stakeholders and information, we map, monitor and analyze social and semantic networks that represent these types of entities. We integrate techniques from natural language processing and network analysis for this purpose. We report on a) our theoretical framework and methodology and b) evaluating the performance and usability of our solution by bringing it into real-world application contexts where we have been collaborating with funders and producers to conduct impact assessments. Finally, we briefly introduce a tool – called ConText - that we have designed and built for this project and beyond. ConText is meant to be of general use for scholars who want to extract network data from text data and jointly consider text data and network data for analysis.

Ethnicity and Networks FRI.PM2

Ethnicity and Networks FRI.PM2

Social influence on ethnic perception - The co-evolution of perceived Roma ethnicity and friendship in Hungarian secondary school classes

Zsolia Boda, , Bálint Néray, András Vörös

Contact: zsofia.boda@nuffield.ox.ac.uk

Empirical studies investigating research questions related to minority groups often have to face with stern identification problems. Results suggest that in certain cases, ethnic identity is situation dependent, and shifts in ethnic identification can be observed (Harris and Sim, 2002; Hitlin et al., 2006; Ladányi and Szelényi, 2006). Brubaker and Rogers (2004) also pointed out that identity is ambiguous and suggested to define ethnicity in terms of beliefs, perceptions and understandings. Following these findings, we measure two different concepts of ethnicity, self-declared ethnicity and ethnicity based on peers' perception, in Hungarian secondary-school classrooms. Our study focuses on the two most prevalent ethnic groups in the context: the Roma and the non-Roma Hungarian. In a cross-sectional analysis, this conceptual distinction has revealed that indeed, there might be differences between someone's self-declared and peer-perceived ethnicity and this has a strong effect on friendships and negative ties between students (Boda and Néray, 2013). The current study examines the dynamic processes related to ethnic perception and friendship, with particular focus on different social influence effects. We examine how the perception of certain influential individuals and groups (the majority of students, popular students, friends), as well as others' self-identification, influences students' ethnic perception about their classmates. For this, the co-evolution of friendship and ethnic perception networks is modelled, using the Stochastic Actor-Oriented Model (SIENA) (Snijders et al., 2010).

Ethnicity and Networks FRI.PM2

The Relational Structure of Race

Jeffrey Smith, University of Nebraska-Lincoln

Contact: jsmith77@unl.edu

This paper uses a relational framework to characterize the structure of race in America. I assume that a racial label (e.g. Black) is not an essential, fixed characteristic of an individual. A category thus carries no meaning by itself, and can only be understood in juxtaposition to other

categories (White 1966; Breiger 1981). The key is finding a way to define the categories relative to one another. Interaction patterns offer an ideal metric as they concretely capture social distinctions in a population without relying solely on predefined labels (Burt 1991). I draw on a social space tradition to formalize this idea (McPherson 2004). Categories are placed into social locations based on observed rates of interaction. Categories are socially far if interaction is unlikely and socially close if they have high rates of marriage/cohabitation (Laumann 1969). I apply this framework to current debates about race and ethnicity in the US. A typical analysis will compare economic and social outcomes between racial categories. The implicit assumption is that race can be defined as a simple hierarchy running from bad to good-or Black to White. The proposed framework allows us to test whether the racial structure can be characterized by a Black-White continuum. Using Census marriage data from 2010, I find that racial categories are not solely defined by their social distance to Black and White. Nor is it the case that all non-Black categories are now "White". This suggests that research based on a White comparison group may be increasingly misleading.

Ethnicity and Networks FRI.PM2

The relationship between youths' network position and delinquent behaviors

Meagan Cahill, The Urban Institute, Caterina Roman, Chris McCarty

Contact: mcahill@urban.org

This study analyzes the network position of youth at-risk of delinquency and gang membership in two networks, one where a majority of the members are Latino and the other where most members are Black. The research investigates three main questions: 1) What are the common positions and roles of individuals in the networks of at-risk youths? 2) Do these common positions and roles vary by race/ethnicity? and 3) How does positional equivalence relate to involvement in both pro-social and delinquent and gang-related behaviors? This work uses cross-sectional social network data collected through attempted censuses of youth in two small, well-defined urban neighborhoods known for gang activity and youth delinquency. Youths' ego networks were overlapped to create whole networks of youth, allowing network-level analysis. Using multiple measures of the equivalence and centrality of nodes within the network, individuals who are similar based on their network position are then compared on both pro-social and delinquent and gang-related measures using clustering techniques. The method allows the identification of allows the identification of similar patterns of behavior among youth who occupy similar positions in the network, regardless of whether they are connected to each other or not. The research also allows us to identify differences--if any--in network structure among Latino and Black youth. The results have practical implications for informing methods employed to address youth delinquency and gang behavior in urban neighborhoods.

International Networks FRI.PM2

International Networks FRI.PM2

Comparing Asymmetry in International Trade Networks between Commodities and through Time

Katherine Faust, University of California, Irvine
, Matthew Mahutga

Contact: kfaust@uci.edu

We extend the analysis of asymmetry in international trade networks by comparing hierarchical patterns of asymmetry across 15 commodity classes at three points in time (1965, 1980, and 2000), using data from the United Nations Commodity Trade Database (United Nations 2012, Mahutga 2013). In addition, we present a principled approach for correctly identifying the overall orientation of asymmetry between countries, provide a means for assessing uncertainty in results using random graphs, and compare results from models of trade asymmetry to results from models of the core-periphery structure of trade volume.

International Networks FRI.PM2

Network Power of Hegemon in Trade Networks

Wei-Lun Huang, <p>Department of Politics and International Studies</p><p>School of Oriental and African Studies (SOAS)</p><p>University of London</p>

Contact: 290361@soas.ac.uk

The social network analysis approach to power analysis is responsive to the criticism of power as a possession or property (Kim 2010). Hafner-Burton and Montgomery (2012) argue that trade institutions promote peace—liberalists’ argument—when the distribution of ties among members is symmetrical; and they facilitate distrust and conflict—realists’ argument—when the distribution of ties among members is asymmetrical. However, they neglect the different conceptualisations between dependence and influence. I argue that the asymmetrical distribution of ties among members not necessarily leads to distrust or conflict, which is often revealed in the hegemonic structure. This paper attempts to provide an analytical framework of trade hegemony. The research question of this study is: how can a hegemon make secondary states acquiescent? Wendt (1999)—a constructivist of international relations—points out three degrees/modes of norm internalisation: force, price and legitimacy. Building on the insights of the power analysis literature, I argue that these three modes of norm internalisation is the products of power exercising. Being dependent is the source of coercive power (hard power)

and being trusted is the source of legitimacy (soft power). In this sense, norm internalisation is the result of the effective exercise of hard and soft power— in Nye's (2008) words 'smart power'. 'Free trade' can be seen as the norm that a hegemon tries to implant into the network. Finally, the three modes of norm internalisation can be indicated by trade dependency (dependence), trade complementary (self-interest), and trade agreement (trust & social capital) respectively.

International Networks FRI.PM2

The Global Corporate Elite Uncovered

Eelke Heemskerk,

Contact: e.m.heemskerk@uva.nl

The transnational orientation and organization of corporate elites has for long attracted the attention of those who expect that ongoing globalization goes hand in hand with transnational elite cohesion. The laborious nature of compiling reliable network datasets has hitherto forced scholars to focus on those arena's where we expect transnational corporate elites to emerge, notably the largest (often stock listed) firms in the western industrialized world. This systemic bias disregards the role of non-western elites in the global regime and neglects a possible multi polar architecture of the global corporate elite. Applying state-of-the-art tools and techniques, we are able to overcome this burden by analyzing the entire network of interlocking directors between a set of 1.000.000 corporations across the globe in 2012. This allows us to uncover the extent to which western and non-western corporate elites occupy similar social circles; which firms, countries, sectors and cities serve as linchpins within the global corporate elite, and as such reveal the sites and spaces where transnational corporate elites organize themselves, both in the west and beyond

International Networks FRI.PM2

Cultural Network Analytics Using Twitter: A Case of Kpop

Jiyoung Kim, Cyber Emotion Research Center Yeungnam University, Ho young Yoon, Hanwoo Park

Contact: madagascar999@gmail.com

The study examines the Twitter international communication network with a reference to Korean popular music (Kpop). We consider Twitter as one of the cultural "software" that cultural actions enabled by software and support actions especially international communication. By analyzing and visualizing how information of Kpop is diffused and shred

in Twitter, we have attempted to link information network with cultural proximity between Twitter users. In doing so, we have revealed the distinct form of communication network across different countries with regard to Kpop on Twitter. For this purpose, we have collected Twitters and user's profile information with the #Kpop hashtag from November 9, 2011, to October 31, 2012 with NodeXL program, an open-source software tool. Analysis of the data has deployed typical Webometric method to map the #Kpop Twitter network of users, hashtags in #Kpop Tweets and use of outlink URLs

Mathematical Models FRI.PM2

Mathematical Models FRI.PM2

A Probabilistic Framework for Distilling Peer Pressure on Decision-Making in Social Networks

Alireza Farasat, University at Buffalo, Alexander Nikolaev

Contact: afarasat@buffalo.edu

This presentation describes a methodology for the analysis of decision-making mechanisms in networked communities. Consider an example where program participation or product adoption decisions of connected actors with varying personal attributes are under study; such decisions can be about engaging into extracurricular school activity, receiving a medical treatment, participating in a political movement, etc. It is assumed that, having formed preliminary individual judgments of a program/product, the actors engage in social interactions that influence their final decisions. The presented probabilistic framework, inspired by Ising model applications in other domains, captures how the underlying structure of dependencies between actors leads to the emergence of peer pressure, which can be seen as either positive or negative influence (depending on a query at hand). Actor similarities in the given problem attributes are treated as explanatory variables for both individual actor judgments and peer-to-peer influence. The constructed model is parameterized using MCMC-based likelihood maximization. In an illustrative example, the model is applied to a network of primary care physicians making choices of adopting/prescribing new treatments to patients. Finally, the model's potential for identifying tipping point conditions for transitions between decision/opinion diversity and uniform actor agreement is discussed.

Mathematical Models FRI.PM2

Algebraic Constraints for Comparison of Multiple Networks

Antonio Rivero Ostoic, Aarhus University

Contact: jari@asb.dk

Networks with similar generator relations are subject to comparison through algebraic constraints found in their role structures. Such constrictions are the hierarchy in their relations, the set of equations among string of ties, and the image matrices of cumulated role structures. The hierarchy in the relations allows making substantive interpretation about the organizational logic of the networks, whereas the set of equations registers the identities produced in the decomposition process of the relational structures, which includes both direct and indirect ties

in the social system. These two constraints are expressed in the image matrices that are role structures characterizing the associations among the representative strings of relations of correspondent actors in the network. All three constraints not only provide valuable information about the algebraic arrangement of the systems, but they are also useful when it comes to establish a shared structure across networks.

Mathematical Models FRI.PM2

Estimation of global network properties by using local aggregated data

Termeh Shafie, [University of Konstanz](#), Ove Frank

Contact: termeh.shafie@uni-konstanz.de

We consider networks that can be modeled as random multigraphs and indicate various applications and appearances of multigraphs. Global properties are measured by entropy and complexity based on the edge multiplicities. Sample data give partial information about the network, and we consider a special kind of local information given by aggregation of vertices and counting of edges within and between blocks of vertices. Shafie (2012) gives a comprehensive analysis and comparison of random multigraphs of different kinds, and Frank and Shafie (2013) present special results about complexity and data aggregation in multigraphs.

Mathematical Models FRI.PM2

Important vertices in acyclic networks

Vladimir Batagelj, FMF, Department of Mathematics, University of Ljubljana

Contact: vladimir.batagelj@fmf.uni-lj.si

Acyclic networks are often describing the evolution of some system. For example citation networks and genealogies. Based on Hummon and Doreian (1989) search path count (SPC) approach we can define also the corresponding SPC vertex index which is counting the number of different search paths passing through a given vertex. In its normalized form its value is equal to the probability that a search path is passing through a given vertex. Another measure, the probabilistic flow index, determines the probability that a search path reaches a given vertex. In the paper we present very fast algorithms for computing both indices, analyze their properties, and present some examples of their application on large citation networks.

Network Dynamics FRI.PM2

Network Dynamics FRI.PM2

Bayesian Analysis of Dynamic Network Regression with Joint Edge/Vertex Dynamics

Zack Almquist, University of Minnesota, Carter Butts

Contact: almquist@umn.edu

Change in network structure and composition has been a topic of extensive theoretical and methodological interest over the last two decades; however, the effects of endogenous group change on interaction dynamics within the context of social networks is a surprisingly understudied area. Network dynamics may be viewed as a process of change in the edge structure of a network, in the vertex set on which edges are defined, or in both simultaneously. Recently, Almquist and Butts introduced a framework for inference on network panel data with vertex dynamics – called dynamic network logistic regression – a subfamily of temporal exponential-family random graph model (TERGM). Here, we expand this approach by exploring Bayesian methods for estimation and model assessment. We propose and implement techniques for Bayesian inference via both MAP and MCMC under several different priors, with an emphasis on easily used, minimally informative priors that may be employed in a range of settings. These different approaches are compared in terms of model fit and predictive model assessment using several reference data sets.

Network Dynamics FRI.PM2

Microprocesses in Network Dynamics: The Role of Individual Agency in the Genesis of Inter-Organizational Networks

Ralph Heidl, Department of Management Michigan State University, Xin Yao, Ann Peng, John Schaubroeck

Contact: heidl@broad.msu.edu

Recent qualitative research on the origin of alliance portfolios points to individual agency as an important factor in organizational network dynamics. This is at odds with extant research assuming inter-organizational network structure to be largely determined by factors outside of individuals' control. We argue individual agency plays a significant role in inter-organizational network dynamics, specify micro-processes through which agency affects dynamics, and present research that tests these micro-processes. In this study, we investigate individual agency in the genesis of alliance networks by examining multi-partner alliance negotiation as a

prototypical cooperation-competition process that can lead to the creation of alliance networks. We conducted a laboratory experiment in which three negotiation partners varied in structural power (low, medium, high). Participants wore sociometric sensors on forehead bands to test how the behavioral orientation towards connecting people (i.e., *tertius iungens*) affects success in a three-party negotiation and the two partners' positive impressions of oneself. Random effects analyses indicated that individual *tertius iungens* orientation was positively associated with these outcomes through verbal (auditory signals) and non-verbal (direct infrared connectivity between sensors) engagement. These results indicate that stronger verbal engagement may enhance short-term economic returns whereas stronger non-verbal engagement may enhance longer-term relational outcomes.

Network Dynamics FRI.PM2

Network Structure in Low-Income Countries: Did ICTs Make a Difference?

Heather Rackin, Louisiana State University, Wesley Shrum, Jr.

Contact: hrackin@lsu.edu

In scholarly and policy contexts, it is a truism that new information and communication technologies (ICTs) have dramatically changed connectivity in sub-Saharan Africa and Asia. However, the impact of technological conditions on the structure of social networks has been difficult to assess with anything other than indirect measures. We present the first results of the only longitudinal survey of social networks in the developing world, using data collected at three time periods, before and after the primary years of ICT diffusion. Owing to professional usage and resource reasons, this sample of researchers and educators represents relatively early adopters. We first address the extent to which research communities in three low-income areas (Kenya, Ghana, and Kerala) have access to ICTs, providing longitudinal data on changes in access to computers, email, and the Internet. Over a ten year period, the digital divide in connectivity may have largely closed for the scientific community in parts of the world that were previously unconnected. In contrast to 2000, where the majority of scientists viewed themselves as users of email but with shared and irregular access to computers and the Internet—access to technology has become almost universal, though significant regional differences remain. Second, we analyze organizational networks over time, using data on nine types of self-reported links between individuals and organizations. Graphs representing network structure, size and density in the 2000, 2005, and 2010 are presented.

Networks and Natural Resource Management FRI.PM2

Networks and Natural Resource Management FRI.PM2

Multilevel networks and socio-ecological systems

Garry Robins, Melbourne School of Psychological Sciences, The University of Melbourne, Australia

Contact: garrylr@unimelb.edu.au

In studying network governance for environmental resources, network structure is often represented as a single-level unipartite system. Within this conceptualization, several structural theories for effective network governance have been proposed. Yet, if the representation itself is inadequate, we risk misspecification and incorrect inference. Sometimes the system may be best conceived as a multilevel network involving both human and environmental nodes: a social ecological system. Although Ostrom (2007) discussed such complex nested systems as a basis for environmental governance, Bodin and Tengo (2012) were the first to give a precise network formulation to a social ecological system. This new conceptualization has dovetailed with recent developments in multi-level networks, including ERGMs for multilevel network structure. I show how these may be applied to the empirical example of Bodin and Tengo on the management of forests by clans in Madagascar. The results invite interpretations about the structural preconditions for sustainability in a social ecological system.

Networks and Natural Resource Management FRI.PM2

Multilevel networks for assessing cross-scale co-ordination in Australia's pest and disease biosecurity system

Ryan McAllister, CSIRO, Kerry Collins, Kirsten Maclean, Catherine Robinson

Contact: ryan.mcallister@csiro.au

Australia has a nationally coordinated quarantine system to help preserve its relative freedom from the many pests and diseases that adversely affect other countries. Maintaining this enviable position is important for the continuing productivity, sustainability and quality of Australian agricultural industries and for the protection of the environment. Across all scales of government, industry and communities, the Australian biosecurity system defines roles and responsibility for reporting and responding to incursions of diseases and pests. This biosecurity system can be conceptualised as a multilevel network of organisational positions participating in multiple committees and expert groups. A report of a suspected biosecurity threat kick-starts

an escalating process of surveillance, diagnostics, planning and response. We explore what happened when Black Sigatoka was found in 2001 in the Banana growing region of Tully, north-eastern Australia. Conceptually we build on a growing body of literature that seeks to understand the structure of networks by linking the distribution of configurations to theory (Bodin and Tengo, 2012; Guerrero et al. in review; McAllister et al., 2014). We employ Exponential Random Graph Modelling (ERGM) to test which sets of configurations (sub-graphs) are overrepresented in the observed network, and use this to explore (1) how well the biosecurity system operates across local, state and national scales, (2) the propensity for certain actors to favour bonding over bridging capital, and (3) how well different network structures enable scientific, local and other types of knowledge to be used to inform credible and appropriate biosecurity management responses.

Networks and Natural Resource Management FRI.PM2

Analyzing human-nature interdependencies using a multilevel social-ecological network approach

Orjan Bodin, Stockholm Resilience Centre, Stockholm University, Beatrice Crona, Matilda Thyresson, Anna-Lea Golz, Maria Tengo

Contact: orjan.bodin@stockholmresilience.su.se

Our study builds on and extends a recently proposed framework where interdependent human/nature systems are modeled and analyzed as social-ecological networks. Following this framework, the social actors and the ecological resources, along with their various types of interdependencies, are conceptualized and modeled as nodes and links in a multilevel network. Although this framework has been developed independently of the recent developments of multilevel ERGM, it carries many similarities. Here we demonstrate how the social-ecological network approach can be applied to shed some light on three key features of concerns in sustainable natural resource management, namely if and to what extent competing resource access is paired with social interactions, how well social- and ecological structures are aligned (i.e. “the problem of fit”), and to what extent resource extractors are able to compensate for fluctuating resources. Our study thus shows how a multilevel network approach can be applied for very different types of research questions transcending scientific boundaries.

Networks and Natural Resource Management FRI.PM2

Centralized Networks and Institutional Fit for Invasive Species Management

Mark Lubell, University of California, Davis

Contact: mnlubell@ucdavis.edu

One of the most important questions in the study of governance institutions and networks is how well they "fit" the collective action problem at hand. Rather than assuming a one-size-fits-all approach, networks and institutions evolve in response to local contextual variables. In this paper, we analyze the collaboration networks of policy stakeholders involved with invasive species management in San Francisco Bay, California. We hypothesize that the networks are very centralized around a small set of coordinating institutions and actors, despite the typical hypothesis that local programs are decentralized. This finding is a major challenge to theories of institutional fit that suggest connectivity in social networks should be correlated with spatial or other types of connectivity in ecological or other collective action problems.

Networks, Economics, and Markets FRI.PM2

Networks, Economics, and Markets FRI.PM2

Facing uncertainty in the interbank market: specification and estimation of relational event models with time-weighted statistics

Paola Zappa, Department of Economics, Statistics and Management University Milano-Bicocca, Caterina Liberati, Duy Vu

Contact: paola.zappa1@gmail.com

How do organizations manage uncertainty? To address this question several studies have taken a relational perspective and highlighted that the more uncertainty, the more likely organizations are to rely on collaboration and exchange ties with others. Less evidence exists, however, on which types of relations are preferred and, therefore, on which network configurations are more likely to emerge. This work focuses on different definitions of trust relations and aims to assess their contribution to facing uncertainty. To this purpose, we create a quasi-experimental design and conceive uncertainty as an exogenous market shock of increasing severity. Using an original dataset on tick by tick money exchanges in the EU interbank liquidity market during 2006-2009, we then examine the dynamics of banks' lending activities and look at how they have changed during the observation period, which is distinguished into three phases (stability, turmoil, economic crisis). Various hypotheses on the effect of the global crisis on banks' strategies of counterparty selection are tested applying Relational event models. In order to account for the co-existence and the different influence of short-term actions and long-term relations, we propose to define time-weighting functions and specify the corresponding time-weighted statistics. The paper adds a piece of empirical evidence to the studies on organizational behaviour and risk management. Also, by comparing the time-weighted model with alternative specifications of time effects, we demonstrate the methodological benefits of the proposed weighting function.

Networks, Economics, and Markets FRI.PM2

Plague and Position: The Black Death and the Emergence of the Medieval Hansa

Bernd Wurpts, University of Washington, Seattle, Katherine Stovel

Contact: wurpts@u.washington.edu

This paper contributes to recent debates on the emergence of organizations and markets (Padgett and Powell 2012, Fligstein and McAdam 2012). Focusing on a historical case from the

late Middle Ages -- the emergence of the political Hansa (Hanseatic League) -- we point to the importance of major epidemiologic shocks as catalysts in processes of organizational emergence. Historians have argued that the Black Death had little impact on patrician structures of the leading Hansa associations (Dollinger 1989:87), though they focused primarily on social categories rather than relations. We reassess earlier historians' claims, and, by focusing directly on the structural features of actual, multiplex networks of relations among patricians, demonstrate that the plague contributed to a new organizational form. Using archival data drawn from city records and testaments of the patriciate in Lubeck spanning the period 1301 – 1400, we show that the network structure at the center of the Hansa changed in the immediate aftermath of the plague, changes that we argue set the stage for the transformation of the Hansa from a mercantile organization to a political supra-regional power. We investigate the relational structure of Lubeck's city council by looking at multiple social relations of family and personal ties. We develop statistical tests to support our claim that it was the new men and their positions within the council that led to the emergence of the political Hansa.

Networks, Economics, and Markets FRI.PM2

The Global Economic Gains and Environmental Losses, as Triggered by US Consumption: A Social Network and Input-Output Approach

Christina Prell, University of Maryland

Contact: cprell@umd.edu

Although research has shown a country's position in the world-system can predict its level of pollution or wealth, there has been little research exploring how these outcomes can be triggered by consumption in the core. In this article, we show how consumption in the U.S., a core country, triggers distributions of value-added and sulfur dioxide throughout the global economy. We track these distributions for all commodities and services consumed in the U.S. (our macro level), then for six commodity groupings (our meso level), and lastly for two case studies (our sector level), these being 'Motor Vehicles' and 'Wearing Apparel'. Our findings show how production for U.S. consumption tends to reify inequalities in the world-system: larger shares of value-added (in comparison to shares of pollution) are generally prompted within the core, whereas the opposite effect tends to be experienced in the non-core. We also discuss interesting exceptions to these general trends occurring at different levels of analysis. Finally, we draw special attention to China, the elephant in the room that exhibits both core and peripheral characteristics.

Networks, Economics, and Markets FRI.PM2

Recruitment-based competition and interorganizational mobility in the Hedge Funds Industry

Vanina Torlo, University of Greenwich, Alessandro Lomi, Daniel Halgin, Andrew Parker

Contact: tv19@gre.ac.uk

We contribute to contemporary research linking social networks and recruitment-based competition by studying the relation between interorganizational career mobility and organizational performance in the hedge funds industry. We argue that upon joining or starting a hedge fund, managers bring with them both knowledge and information acquired in their prior experience (human capital) as well as network ties to external resources and sources of information (social capital). We postulate that performance of hedge funds increases when they attract managers who have more human and social capital. In addition we postulate that hedge fund managers with a highly resonant positive social identity (conferred, for example, by affiliations with prominent financial institutions such as Goldman Sachs) have access to better funding opportunities and to the best potential investors. As a consequence, the performance of hedge funds at the receiving end of mobility events involving managers with highly resonant identities improves. We test our hypothesis through an analysis of the complete career trajectories of hedge fund managers and treat the trajectories as longitudinal 2-mode networks.

Online Networks FRI.PM2

Online Networks FRI.PM2

The Structure of Online Activism

Kevin Lewis, University of California, San Diego, Kurt Gray, Jens Meierhenrich

Contact: lewis@ucsd.edu

Despite the tremendous amount of attention that has been paid to the internet as a tool for civic engagement, we still have little idea how “active” is the average online activist or how social networks matter in facilitating electronic protest. In this paper, we use complete records on the donation and recruitment activity of 1.2 million members of the Save Darfur “Cause” on Facebook to provide a detailed first look at a massive online social movement. While both donation and recruitment behavior are socially patterned, the vast majority of Cause members recruited no one else into the Cause and contributed no money to it—suggesting that in the case of the Save Darfur campaign, Facebook conjured an illusion of activism rather than facilitating the real thing.

Online Networks FRI.PM2

Migrants, Personal Networks, and Loneliness: The Context-Dependent Usefulness of the Internet

Erik Van Ingen, Tilburg University

Contact: e.j.vaningen@uvt.nl

We examine whether the effects of Internet usage on loneliness are context dependent. This is predicted by theories about buffering effects of social networks: social resources are usually buffers against well-being loss in stressful circumstances. Likewise, the effects of participation in social network sites (SNSs) should be greatest when there is a need for social connectedness. We apply this reasoning to the case of immigrants in the Netherlands and examine whether the profits from SNS usage are greater for them than for the native Dutch. After migration, there is a need to establish new ties in the destination country and a need to maintain the ties to close others back in the country of origin. The Internet can help here: there are several online applications that provide alternatives for face-to-face interactions. Hence, we predict that SNS usage should have greater effects on loneliness among immigrants. Preliminary analyses on a dataset that is representative of immigrants in the Netherlands support this idea: immigrants who used social Internet applications had larger core discussion networks (CDNs) and more of

ties abroad. In addition, they seem to have higher-quality ties in their CDNs: the average level of trust is higher. The latter partly explains the significant difference between the effects of SNS usage among immigrants and natives. We conclude that the rise of the Internet may have changed the impact of migration on strong tie networks, and that the effects of the Internet are context dependent.

Online Networks FRI.PM2

Pizza Talk III: Online Firestorms - Negative Dynamics in Social Media Networks

Juergen Pfeffer, , Thomas Zorbach

Contact: jpfeffer@cs.cmu.edu

Social media networks are perfect environments for the proliferation of information. Due to the speed of these media a very large number of people can be reached through interpersonal networks. Marketers work with social media to create word-of-mouth (WOM) campaigns to propagate new ideas and products. The other side of the coin is that companies as well as celebrities and politicians have increasingly been facing the impact of negative online WOM by social media users (online firestorms). Within a short period of time thousands of online users can (aggressively) attack a person or company as a reaction to a questionable statement or activity. In this presentation we show current examples of online firestorms and discuss this fairly new phenomenon by connecting it to traditional network analysis and other social science theories. We derive factors, resulting from structure and dynamics of social media platforms that drive the proliferation of negative dynamics. We also show evidence that existing communities are responsible for these dynamics rather than spontaneously formed ones.

Online Networks FRI.PM2

The relevance of digitally-mediated ties in yielding social capital

Cornelia Reyes Acosta, London School of Economics and Political Science

Contact: C.Reyes-Acosta@lse.ac.uk

Online social networking platforms have introduced new dimensions to the manner in which individuals may seek socio-economic resources. Such "digital networking" may be particularly useful with regard to those in creative industries such as art, music and photography where access to exclusive – typically offline – networks is limited - most notably for those individuals with less socioeconomic standing. This research explores creative professionals' perceptions of the relevance of digitally-mediated ties and discusses the degree to which they yield social capital-actual and perceived. This work is designed to build an understanding of how the

affordances of social networking platforms shape creative professionals' attempts to build and maintain the socio-economic relations crucial to commercial success. Employing a mixed-methods approach, I solicit individuals' perception of social relationships fostered via online social networking platforms by means of in-depth interviews where participants are asked to interpret a visualization of their online personal networks (using the VennMaker tool) with the goal of elucidating the degree to which online relations, and thus the affordances of social network platforms, impact individuals' attitudes with regard to the utility of these relations for achieving their professional goals. Results suggest a need for a more holistic definition of social capital with regard to how creative professionals may gain access to socio-economic resources. In light of this I advance a novel conceptual framework that integrates online relations into the complex processes that shape the action of and opportunities for individuals in fields of cultural production.

Social Capital FRI.PM2

Social Capital FRI.PM2

How does Social Capital affect Occupational Careers of Investor Relations Managers?

Betina Hollstein, University of Hamburg, Martina Maas, Juergen Pfeffer

Contact: betina.hollstein@wiso.uni-hamburg.de

Following the path-breaking study of Mark Granovetter (1974) many studies have shown how important social contacts are for searching a job and finally getting a job. In this presentation we are interested in network effects on professional vitas, i.e. what is the impact of social capital on professional career advancement? The focus of this study is on Investor Relations Managers - a rather new occupational group in Germany. Goal of our research is to study their occupational careers and to identify the impact of social capital on their vitas, i.e. social support provided by family, friends, and colleagues. For this purpose, career paths need to be collected.

Consequently, we invited all (approximately 1,000) Investor Relations Managers in Germany as well as some former managers to participate in a standardized online questionnaire (N = 194). Additionally, we conducted 30 qualitative in-depth biographic interviews with a selected sub-sample. By making use of network visualization and information visualization techniques we illustrate aggregated career paths of an entire occupational group and analyze the impact of social capital on these paths. Which type of social capital is important at career entry and for which positions, which is more important later in one's career?

Social Capital FRI.PM2

Investment in Romance as Social Capital: How Many Boyfriends/girlfriends Lead to Marriage?

Jun Kobayashi, Seikei University

Contact: jun.kobayashi@fh.seikei.ac.jp

1 Research Question In modern societies, romance is a prerequisite to marriage. But its effects are yet to be fully investigated. So, this paper examines a research question of how many boyfriends/girlfriends result in marriage. Here, I assume that people invest in romance as social capital in the marriage market. They accumulate candidates of future partners and get married as the return of investment. I hypothesize that the highly educated people will accumulate more candidates, and therefore more romantic relations will lead to marriage. 2 Methods I use the 2011 Tokyo Survey on Marriage and Child Care as data. The dependent variable is whether a respondent has ever married or not (1 if experienced). The dependent variable is numbers of

romantic relations before the first marriage. I control for gender and age. 3 Results I test the hypothesis by conducting logistic regressions. The sample is decomposed into K-12 and college. Among college graduates, romance has a significant curvilinear effect. If they have 2.7 boyfriends/girlfriends, they have a maximum chance to get married. Among K-12, on the other hand, romance has a significant positive effect. One more boyfriends/girlfriends provide 1.4 more chances. Therefore, the hypothesis is rejected. 4 Conclusion I found that romance played different roles at different educational levels. This might be because people invest in social capital in various ways. It seems that highly educated try to concentrate on small numbers while low educated invest in large numbers.

Social Capital FRI.PM2

Navigating the Way with the “Right” Kind of Disposition: Cultural Capital, Techno-Capital, and Networking Skill

Kyung Sun Lee, <html />, Wenhong Chen

Contact: Karenlee48@gmail.com

The importance and the benefits of networking skills have been identified by numerous studies, but much less has been written about where networking skills come from. A majority of such studies treat networking as a human-capital driven by individual attributes that incline some to network better than others. This paper argues that what may seem to be a “natural talent” may be something that has been passed down and ingrained over an extended period of time. By using the concept of cultural capital, we seek to shed light on the social structural factors in shaping individual's networking skills. Specifically, this study argues that cultural capital equips individuals with the “right” kind of disposition to present oneself to others. As a form of cultural capital, we use the concept of techno-capital in order to explore how accumulated ICT-related resources shape one's networking skills. As the phrase “digital reproduction of inequality” articulates (Hargittai, 2008), online activities are an extension of that of offline, and vice versa. Therefore, based on a survey of 594 college students this paper investigates the level of cultural capital, techno-capital and their relationship to networking skills of individuals. Using college students contributes to the relative lack of literature on networking skills of students compared to business professionals. It is also said that college students lack and are unaware of the importance of networking (Janasz & Forret, 2008). This study hopes to add insight to the multidimensionality of causal factors that may be behind this statement. Results and implications are discussed

Social Capital FRI.PM2

Similarly Extroverted: Personality Homophily in Social Networks

Adam Kleinbaum, Dartmouth College, Daniel Feiler

Contact: adam.m.kleinbaum@tuck.dartmouth.edu

Surprisingly little research has examined the role of extroversion, a fundamental personality variable, in shaping social networks. Extraversion—the extent to which an individual is outgoing or reserved—has two important implications for the emergence of social network ties. First, extroverts will tend to name more people as friends and to be named by others as a friend more often. Second, there is a homophily effect of extraversion: individuals will tend to form ties with others with similar levels of extraversion. Combining these two effects, the main effect and homophily effect counteract one another for introverts, causing them to be friends with introverts as often as with extroverts. For extroverts, by contrast, the main effect and homophily will be mutually reinforcing, causing extroverts to be significantly more likely to be friends with extroverts. Consistent with this idea, we show that introverts tend to have contacts whose level of extroversion mirrors that of the population, while the contacts of extroverts are significantly more extroverted than the population. We discuss how these effects may lead introverts to be better socially calibrated, with important consequences for leadership effectiveness and product development.

Network Mechanisms and Network Evolution SAT.AM1

Network Mechanisms and Network Evolution SAT.AM1

Learning Online – Interactivity in an Online Community of Inquiry

Christine Bevc, University of North Carolina - Chapel Hill, Marie Pryor, Karen Peterman, Ruth Kermish Allen

Contact: bevc@unc.edu

The recent increase in online networks and asynchronous learning environments has raised questions about how technology can be used to promote learning, through individual use and/or through collaborations mediated by educational platforms. Rather than focusing on educational outcomes, the focus of this work shifts to examine the levels of interactivity among users within and across the online environment, to more fully explore the underlying mechanisms of knowledge and inquiry processes. To examine this behavior, we apply a temporal ERGM (tergm) to examine the evolution of interactivity in an online non-hierarchical learning environment. In this pilot study, we utilize data collected from WeatherBlur, an online learning community for investigating the impacts of climate change on local ecologies through citizen science. The study population is comprised mainly of elementary school students, their teachers, local fisherman, community members, and scientists from coastal and island communities in Maine and Alaska. We examine the “community of inquiry” created among 214 users and their more than 1,200 interactions over the course of a 2-month period in Fall 2013. The analysis examines users’ interactions with online learning content, student interactions with instructors, scientists, and local fisherman, as well as interactions among other students across the WeatherBlur platform. The results will provide an increased understanding of the dynamics mediated through the online social and technological infrastructure. The findings of this research will be used to refine future investigations, as well as broaden implications for online and distance-based learning.

Network Mechanisms and Network Evolution SAT.AM1

Network Lithology: Techniques for Identifying Subgraph Composition

Sean Fitzhugh, University of California, Irvine, Carter Butts

Contact: sean.fitzhugh@uci.edu

Different processes give rise to network structures with distinctive properties. In this paper our goal is to associate network structures (specifically, subgroups) with the conditions under

which they form. We examine particular structures by identifying the properties of individuals associated with the structure. Clues to the process of group formation and the context in which it forms may be extracted from the properties of individuals in that group. Following this intuition, we propose a general technique for identifying systematic patterns of attribute occupancy to determine how individual attributes may drive group formation. To link the social context in which groups form to their structural signatures, we relate subgroup composition to nodal attributes. We illustrate the utility of comparing subgroup (e.g., clique, n-clique, k-core, etc.) co-membership with nodal co-membership in a variety of attributes. The correlations of these co-membership matrices illustrate clearly how the strength of association between shared attributes and shared subgraph membership varies across subgraphs of different sizes. Additionally, these correlations fit well into a QAP framework to determine where shared subgraph membership has a stronger (or weaker) relation to shared attribute membership than we would expect by chance. We demonstrate the technique with a series of large, online friendship networks on the order of thousands of nodes to illustrate how factors such as gender, cohort, residence, and other attributes are associated with co-membership in a variety of clique sizes.

Network Mechanisms and Network Evolution SAT.AM1

Studying the Evolution of Online Collective Action: Saudi Arabian Women's 'Oct26Driving' Campaign on Twitter

Nitin Agarwal, University of Arkansas at Little Rock, Serpil Yuce, Rolf Wigand, Merlyna Lim, Rebecca Robinson

Contact: nxagarwal@ualr.edu

Social media have played a substantial role in supporting collective actions. Reports state that protesters use blogs, Facebook, Twitter, YouTube and other online communication tools and environments to mobilize and spread awareness. In our research we focus on the process of formation of online collective action (OCA) by studying the diffusion of hashtags. We examine the recently organized Saudi Arabian women's right to drive campaign, called 'Oct26Driving' (conducted on October 26, 2013) and collected the Twitter data, starting from September 25, 2013 to November 14, 2013. Given the definitive nature of hashtags, we investigate the co-evolution of the hashtag usage and the campaign's social network. The study considers the dominant hashtags dedicated to the Oct26Driving campaign, viz., '#oct26driving' and 'اك توب ر 26 ق يادة#'. The study identifies cross-cultural aspects pertaining to individual hashtag networks, especially the Arabic hashtags relating to local factors and English hashtags contributing to transnational support from other organizations, such as those related to human rights and women's rights. Despite the wide news media coverage of social movements, there is a lack of systematic methodologies to analytically model such phenomena in complex online environments. The proposed research aims to develop models that help advance the

understanding of interconnected collective actions conducted through modern social and information systems. At a broader level, the study analyzed the role of information technology mediated communications in the formation of emergent organizations with implications to business, marketing (explaining viral behaviors) and many other settings.

Network Mechanisms and Network Evolution SAT.AM1

Towards Understanding the Laws Behind Small World and Scale Free Network Formation

Alexander Nikolaev, University at Buffalo, Sushant Khopkar, Rakesh Nagi

Contact: anikolae@buffalo.edu

Being the richest source of human interaction records, Online Social Network (OSN) data can be hard to interpret. Many OSN account owners maintain hundreds of connections, easily surpassing the Dunbar number of 150. This paper presents an intuitive model that sheds light on tie formation in and beyond OSNs by bridging the gap between Duncan-Watts and scale-free worlds. The model describes how the information about a talented individual, embedded in a lattice with rewired links, may propagate from their “close-friend circles” towards “the masses”. Assume that, having heard of and having appreciated the talent of an actor, another actor will remember (choose to follow) the talent and will be willing to spread the news further to their own close friends. This paper shows that in the described setting, a follow-link degree power law emerges, according to the principles that are fundamentally different from those of preferential attachment. While preferential attachment works under complete mutual visibility of network actors, the presented formation mechanism relies on local, myopic information exchanges. It implies that rare events play the main role in early popularity growth. It thus explains and provides a means for evaluating how likely a talented individual is to “make it to the big leagues” or “stay in obscurity”, or a not-so-talented individual to “jump over their head”. The distribution of talent over the entire population is assumed normal. The parameters of this distribution and those of Duncan-Watts lattice are varied, as the paper reports on multiple illustrative computational experiments.

Network Mechanisms and Network Evolution SAT.AM1

Understanding and diagnosing degeneracy in ERGM specifications

KE LI, University of Washington, STEVEN GOODREAU, MARTINA MORRIS

Contact: kirkli@stat.washington.edu

The term “degeneracy” has been used to describe a range of pathological phenomena that occur with some ERGM specifications. The phenomena take the general form of model estimates that,

when used to draw realizations from the distribution, do not reproduce the observed network statistics. In this presentation we will start by describing the degeneracy of some well known vulnerable models, and provide insight into the geometric and statistical characteristics of the model that give rise to the problem. We will briefly summarize current approaches for reducing degenerate behavior, and present work in progress on diagnostics that can be used to identify, prior to estimation, model terms that are likely to cause problems.

Networks and Culture SAT.AM1

Networks and Culture SAT.AM1

Cultural tastes and patterns of homophily

Brandon Sepulvado, University of Notre Dame

Contact: bsepulva@nd.edu

Homophily, the tendency for individuals to have similar alters, is commonly associated with sociodemographic characteristics, such as race/ethnicity, gender, and socioeconomic status, yet less research exists investigating the relationship between cultural tastes and patterns of homophily. Using survey along with behavioral (text message and phone calls) data collected from 161 first year students at the University of Notre Dame, I examine how cultural consumption, specifically music genre preferences and cultural event attendance, relates to tie formation during the students' first year. This data, in addition to allowing examination of cultural taste and homophily, permits a better understanding of homophily's causes because students are entering a new sociocultural location while simultaneously forming new ties, and this dynamic provides an ideal time to examine the relative importance of structural and dispositional factors in the production of homophily. Specifically, I use campus foci, such as dormitories, academic majors, and classes, to see exactly how the existing campus organization into which students enter influences the available pool of alters, and I use survey information concerning 22 music genres and 12 types of cultural events along with a battery of personality scales to test not only the impact of dispositional characteristics on homophily patterns but also the variance attributable to cultural tastes. Preliminary results suggest the importance of both structural and dispositional factors in the formation of homophilous ties.

Networks and Culture SAT.AM1

Guessing the sold-out formula: networking and gatekeeping in the live music scene of Atlanta

Yun Tai, Emory University

Contact: ytai2@emory.edu

In cultural production, many use the term "gatekeepers" to describe key decision-makers who stand between creative workers and audiences—such as those who filter out which of many bands are eventually shown to the public. Taking on the art-world approach associated with Howard Becker, this study demonstrates how "gatekeeping," as an activity in art worlds, can be seen as socially constructed collective process by examining whether and how band bookers of

music venues with various status, as gatekeepers in live music business, employ conventions to deal with high uncertainty in cultural and creative industries. Given the importance of social connection in social process and cultural production, this research examines the network among music venues in Atlanta, with the bands that they have presented as bridges—this network analysis approach allows us to further understand gatekeeping as a part of the collective process of creation and dissemination. Drawing on the entertainment lists of an Atlanta weekly newspaper (Creative Loafing) in the year of 2012, a network of 175 music venues in Atlanta is constructed, representing the sharing of bands/artists by venues. The status of venues is addressed by media coverage—the frequency of the 175 venues mentioned or highlighted by the two Atlanta newspapers—the Atlanta Journal-Constitution and Creative Loafing. Selected findings indicate that while venues with higher-status media coverage tend to share bands, bookers at lower-status venues are more likely to have unique choices of bands, which reveal that the conventions of gatekeeping through networking are constructed differently for different status groups.

Networks and Culture SAT.AM1

In search of cultural taste patterns: a network analysis on the clustering of music preferences

Jef Vlegels, Ghent University

Contact: jef.vlegels@ugent.be

Research on cultural consumption typically identifies different cultural patterns which allow researchers to sort cultural practices into categories. These patterns are based on a perceived similarity among cultural 'genres'. Examples are the 'highbrow' vs. 'lowbrow' dichotomy and omni- versus univores. Numerous studies have used these cultural patterns to investigate their link with social strata and all kinds of different personal attributes. There is however an important issue concerning the operationalization of these cultural taste patterns. Researchers typically use a list of pre-defined genres to capture the (dis)liking of the genres they consider as important. Obviously, there is a risk to impose a normative classification. The list of genres can be, outdated, out of context, incomplete, inspired by commercial institutions, etc. Furthermore, cultural genres do not necessarily have strict boundaries resulting in discrete and exclusive categories. We present an alternative method to identify music taste patterns based on an open question for artist and/or band preferences. We use the 'Participation in Flanders 2009' survey to construct a matrix of persons (y-axis) and band/artist preferences (x-axis). We fit an Infinite Relational Model to this bipartite network to identify bands/artists that have a similar relationship to the same set of persons and thus to construct music taste patterns from the bottom up. The main research questions are: (1) how are people clustered in a matrix of persons and band/artist preferences (2) how do the resulting music preference patterns correspond with the existing classifications methods based on music genres.

Networks and Teams SAT.AM1

Networks and Teams SAT.AM1

The Structures of Leadership Reliance Networks that Facilitate Innovation in Multiteam Systems

Sophia Sullivan, Northwestern University, Leslie DeChurch, Stephen Zaccaro, Noshir Contractor

Contact: sophiasull@gmail.com

Innovative tasks are increasingly being completed in more complex networks of teams, or multi-team systems (MTSs). These MTSs allow for the distribution of domain-specific tasks to different experts located in different teams while enabling a flow of ideas between teams. However, they require members to rely on other teams whom they may never meet face-to-face. Therefore, forces that provide structure within the team are necessary to ensure that ideas are shared and tasks are completed. Functional leadership theory suggests the need for divergent (creativity-enhancing) leadership and convergent (decision-making) leadership to enhance innovation. Since leadership is a relational concept, we use p*/ERGMS to analyze the influence of divergent & convergent leadership reliance networks on the innovativeness of multi-team systems. We use data from a multi-institutional, cross-functional study of 31 MTSs, with 4 component teams each composed of 9 - 12 members to perform this study.

Networks and Teams SAT.AM1

Communication Networks in a Hospital Intensive Care Unit

David Shoham, Loyola University Chicago, William McGaghie, Richard Gamelli, Jeanie Leggett

Contact: dshoham@lumc.edu

Introduction: Effective team communication is critical in complex settings such as hospital intensive care units (ICUs). We conducted a study in a burn patient ICU, hypothesizing that physicians and key members of the nursing staff would occupy the core of the network and that there would not be any structural holes. Methods: We created a sociometric questionnaire including a roster of team members, asking all respondents (egos) to list frequency (0 to 3+ times) of discussions of patient care issues with other team members (alters). We calculated the proportion completing the questionnaire, created a sociogram of the network, and identified central positions and network bridges. Results: A total of 69 alters were listed by 48 respondents (70% completion rate). There were 626 arcs present (density=13.3%). Team members' roles

included registered nurse (n=24), physician (5), medical student (4), respiratory care (4), patient care (3), social worker (2), and others. The sociogram showed a core comprised primarily of physicians, several nurses, and a dietitian. Betweenness centrality scores ranged from 0 to 12.1%; the top 5 central team members included 2 physicians, a social worker, a nurse, and a dietitian. Others were less central. We did not identify any structural holes in the network. Conclusions: We established the feasibility of collecting network data on this medical team, and identified robust patterns of communication. This pilot study will be used to guide data collection in more teams so that we may relate structural features to process outcomes and patient safety.

Networks and Teams SAT.AM1

Informal Boundary Spanning in Multiteam Systems

Ralph Heidl, <p>Department of Management</p><p>Michigan State University</p>, John Hollenbeck, Michael Howe, Andrew Yu

Contact: heidl@broad.msu.edu

Multiteam systems (MTS) are networks of “component teams” where each team has a specialized function highly interdependent on other teams within the system. A high performing MTS features (1) highly cohesive teams to support effective within team processes and (2) effective boundary spanning relationships to support the exchange of information between teams. Multiteam systems retain the flexibility and responsiveness of single teams, while leveraging specialized functions of other component teams to solve highly complex problems. Yet, unique challenges arise before the potential benefits can be realized: sub-optimization of between team processes may occur when individuals with specialized, but divergent capabilities are brought together. The success of a high performing MTS depends on the both the formal boundary spanning ties and the informal boundary spanning ties (IBST) to facilitate between team relationships. The core proposition of the “Accelerated Degeneration Theory” (ADT) predicates on the belief that the quality and distribution of informal boundary spanning ties (IBSTs) are a key determinant of MTS performance, which is maximized when the number of IBSTs are evenly distributed. This maximizes available resources to process information effectively, while limiting the potential of any single actor to achieve gains that may accrue from information hoarding. To test the propositions associated with ADT, we rely on data of formal and informal boundary spanning ties collected for a MTS embedded in a large scale scientific project. Our theoretical propositions and empirical findings have practical implications for the management of multiteam systems.

Networks and Teams SAT.AM1

Using Relational Event Networks to Understand Team & Multiteam System Interaction Processes

Aaron Schechter, Northwestern University, Roger Leenders, Leslie DeChurch, Noshir Contractor

Contact: aaronschechter2016@u.northwestern.edu

Modern organizations are increasingly built around “teams of teams” or multiteam systems (MTSs) that must manage a delicate interplay of interactions within and between teams. This study advances research on MTSs by exploring the relational dynamics that unfold within and between teams, and their consequences for success. Rather than examine the cumulative snapshot of communication interactions in an MTS as a static or consolidated network, we study how the sequential unfolding of individual relational events leads to future interaction behaviors. We identify “sequential structural signatures” that shape the emergence of communication sequences in MTSs. In particular, we study intra-team communication, inter-team boundary spanning behavior, and homophily across institutional roles as key mechanisms driving interaction. These generative mechanisms which explain the unfolding of communication sequences will not necessarily be identical across MTSs and we argue that the strength of these generative mechanisms in a given MTS will affect influence MTS performance; we test this through statistical comparison of the sequential signatures. Performance is tested at both the team level and the MTS level. Using an experimental setting, we analyzed communication logs and in-game performance metrics from 28, twenty-person MTSs performing a humanitarian aid task. Results indicate that some generative mechanisms varied in significance across MTSs, while others were consistently significant but varied in strength. When mechanisms unfold such that between-team communication influences subsequent within-team communication, performance is maximized at the team level. Conversely, when within-team communication influenced subsequent between-team communication MTS performance is maximized.

Networks in Education SAT.AM1

Networks in Education SAT.AM1

Alcohol consumption and friendship in vocational schools

Vera Titkova, National Research University Higher School of Economics – St. Petersburg,
Valeria Ivaniushina, Daniel Alexandrov

Contact: tvera.v@gmail.com

Our paper is concerned with the coevolution of friendship and individual drinking behavior and the role of adolescents' individual characteristics in this process. Vocational schools in Russia allow most advantageous research design for the study effects in question. Students after the 9th grade (age 15) are choosing between academic and vocational education, and vocational schools are separate entities to which students come from different schools and where networks among freshmen are formed de novo. Vocational schools are usually gender segregated by future occupation, students come from low SES families, and drinking is more prevalent there than in academic schools. It is known that girls form more dense and intimate networks than boys, and boys have higher rate of alcohol consumption than girls. With this in mind we selected for panel survey 3 vocational schools in St. Petersburg, with different gender composition: (1) all-female school - 95% girls, (2) all-male school- 3% girls, (3) mixed gender school- 24% girls. The survey started in the Fall 2012 and presently has 3 waves for analysis. The data on 511 students contains support networks, academic/school attitudes (motivation, engagement, sense of belonging), psychological characteristics (aggression, social anxiety, depression) as well as socio-demographic characteristics (including parental occupational status). Survey also collected detailed data on drinking patterns – both frequency and the different types of alcohol drinks consumed. We use SIENA for modeling networks of three vocational schools separately: all-girl school, all-boy school, mixed gender school. All effects are controlled by gender and family SES of students.

Networks in Education SAT.AM1

Field Differences in Predictors of Research Productivity

Rich DeJordy, D'Amore McKim School of Management
Northeastern University, Christina Falci, Kathrin Zippel

Contact: r.dejordy@neu.edu

Based on EgoNet research at a large midwestern university, we evaluate network predictors of career productivity (as measured through publication count) and perceptions of research being valued (measured through self report) for faculty across multiple disciplines. We find significant and positive effects not only for size of research collaboration networks on research productivity, but also for the heterogeneity of international collaboration within the network, but none for research value. Further, we find a moderating effect by discipline, such that the effects above are more pronounced for STEM faculty, but heterogeneous international collaboration actually has a negative effect for social science faculty. Our results suggest that while international collaboration is advantageous for productivity in general, the gains from such collaboration are more than exceeded in research areas focusing on social contexts, where diversity of perspectives may actually hinder productivity.

Networks in Education SAT.AM1

Peer Influence on School Readiness During Preschool: A social Network Analysis of At Risk Preschool Children

Dawn DeLay, Arizona State University

Contact: dawn.delay@asu.edu

The Head Start program, aimed at promoting academic success among disadvantaged youth, is a popular and longstanding program. In such programs, peer selection and influence processes may help to shape school readiness and academic success. However, little is known concerning how peer relationships influence academic outcomes during the preschool years. The current study uses Rsiena (Ripley, Snijders, & Preciado, 2013) to investigate peer selection and influence as a function of preschool students' school readiness. We expected (a) children to choose play partners for similar levels of school readiness (selection) and (b) children to model the school readiness of their play partners (influence). Participants were preschool-aged children enrolled in 18 Head Start classrooms. Children were observed extensively with their play partners for one academic year and observations were divided into four waves to determine social networks at each time point. Teacher aides rated 7 school readiness items on a 5-point (1=not true; 5=very true) scale at four waves during the school year. To mitigate potential confounds, control

variables (e.g., gender, age, language spoken, ethnicity, family financial strain, parent education, time in the classroom, and repeating a year in the classroom) were included in the model. Rsiena estimates demonstrate that preschool students select play partners with similar levels of school readiness and are influenced by play partners to become more similar in school readiness over time. Preschool children selectively choose play partners and are influenced by their play partners, so that peer relationships affect early levels of school readiness and academic success.

Networks in Education SAT.AM1

Using Social Network Analysis to nurture cooperative learning

Christa van Staden, INSNA

Contact: christa@taaldienste.com

Most learning theories and models focusing on improving performance in working environments are anchored on the basic idea that people need one another to learn. From a Social Network Analysis perspective, teachers rely on one another to get access to information, knowledge, experience and concrete resources available in their working environments. They also rely on one another for advice, support and leadership to enhance their performance. Therefore it is not surprising that teachers already found value in utilising social networking sites to bridge time and place constraints to support their need for continuing learning. However, in doing this, the collective knowledge base can be scattered over several technologies and might even prevent teachers from accessing the shared resources. Therefore it is important that educational leaders take charge by implementing effective social networking sites to support networked learning and the development of a collective, sustainable knowledge base. The effectiveness of such a tool depends on the selfdirectedness of the teachers. Some are individualistic learners, who might access the sites to tap from the shared resources without adding social capital. Others are competitive learners, who might prevent colleagues from accessing the collective knowledge base in order to create a competitive advantage. The aim of this paper is to show how Social Network Analysis provides an effective tool to identify both individual and competitive learners so that cooperative learning, continuing professional development and the development of sustainable collective social capital can be nurtured.

Online Networks SAT.AM1

Online Networks SAT.AM1

Twitter Triads: Transitivity in Online Social Networks

Parul Malik, Purdue University, Seungyoon Lee

Contact: pmalik@purdue.edu

Transitivity is an important structural tendency in social networks, and has also been found to be a strong predictor of tie formation in directed social networks. However, the factors affecting transitivity itself are understudied, in particular, in the context of online social media. In this paper, we explore the various factors affecting transitivity in directed networks on Twitter. We define transitivity as the tendency for an actor A to follow actor B, given that A follows X and X follows B. We measured the transitive triad formation tendencies over millions of connections in Twitter. We tested several hypotheses, and found compelling evidence for some factors: for instance, there is a strong positive correlation between the number of shared connections between A and B, and transitivity. On the other hand, X being a prestigious actor is negatively correlated with transitivity, i.e, the interest in a prestigious actor does not extend to the people the prestigious actor is interested in. We will make the data and code available so that the study can be replicated, and can also be used by fellow researchers to study other structural properties.

Online Networks SAT.AM1

How Can We Evaluate Nonprofit Organizations' Online Presence and Performance on Social Networking Sites by Network Measures?

Jennifer Ihm, Northwestern University

Contact: ihm@u.northwestern.edu

Social networking sites (SNS) have raised attention for new opportunities of nonprofit organizations in organizational disclosure, dissemination of information, and involvement with stakeholders (Waters, Burnett, Lamm, & Lucas, 2009). Likewise, previous studies support the potential of SNS to generate collective action in the community (Aaker & Smith, 2010; Bennett & Segerberg, 2012) and identify numerous uses of SNS for nonprofits (Mansfield, 2012; Mathos & Norman, 2012). Strategic use of SNS, however, requires a focus on improving evaluation of nonprofits' online presence and performance on SNS. Existing measures of nonprofits' SNS activities include total number of followers or tweets and content analysis (Lovejoy & Saxton,

2012; Waters & Jamal, 2011). The length and qualitative nature of these measures limits ease of use in representing nonprofits' online performance. Using network measures, this paper introduces more pragmatic ways to examine nonprofits' SNS activities. Drawing on one-week twitter activities of the 100 largest U.S. nonprofits, this study captures more meaningful SNS activities such as active users vs. total followers, reciprocity between the organization and the users, density without the organization's edge, and degree centrality of the organization. This paper suggests that network measures are appropriate for capturing idiosyncratic features of organizational SNS uses such as interactivity, multiple stakeholder reachability, and stakeholder connectivity (Mansfield, 2012). This paper contributes to network studies by offering a practical adaptation of the network concept, providing a pragmatic interpretation and comparison of network measures, and discovering the significance of relational structures in online communication activities.

Online Networks SAT.AM1

Why Players Leave: Exploring Major Factors of Quitting EverQuest II

Yun Huang, Northwestern University, Julia Neidhardt, Noshir Contractor

Contact: yun@northwestern.edu

In online games as well as many online social sites, the success and attractiveness of a community is strongly determined by the active participation of its members. Analyzing why people leave and predicting churn behavior becomes a critical challenge, especially with the mutual influence among users. The purpose of this paper is to explore important factors that influence quitting decisions in games from three dimensions: achievement, commitment, and social network effects. In EverQuest II, a massively multiplayer online role-playing game, we identify different player attributes such as their progress and rewards in game, time committed on different game activities, and team and organization relations and examine their impacts on the likelihood of unsubscribing the game. In particular, we focus on social influence in players' teaming network and characterize the contagious effect of quitting behavior. We use a generalization of Exponential Random Graph Models (ERGM/ p^*) to study the social influence among users who played together. Our results show that players with higher achievement, such as higher levels, more award items, and more kills, are less likely to quit the game. The commitment on game activities has a mixed effect: players spend more time on building items are more likely to quit but players spend more time on trading items are less likely to quit. For social effects, we find that players who have more teammates and join a guild are less likely to quit. However, the likelihood of quitting increases significantly with the number of quitting teammates.

Online Networks SAT.AM1

Understanding online health buddy networks: Dynamic network formation and influence on individual health progress

Jingbo Meng, University of Southern California

Contact: jingbomeng@gmail.com

The present study examined co-evolution of self-organized health buddy network and individual health progress in an online health social network. Technology entrepreneurs have incorporated social networking features in online health communities. However, it is not clear how self-organized health buddy networks are formed and what influence they exert on individual health outcomes. This study used a snowball sampling strategy and collected a large connected component in an online weight management social network. For users included in the network data, the study also collected their data including start weight, goal weight, weight self-tracking behavior, weight updates and demographics. Network, individual attributes and behavioral data were collected once a month from April to August 2013. For a sub-sample (N = 375) whose weight outcome data were updated at every time point of data collection, RSiena was used to analyze the joint dynamics of health buddy networks and individuals' weight management progress. RSiena analysis yielded three major results. With respect to the mechanisms driving the formation of online health buddy networks, first, members in the online weight management community select members who share similar start weight to be their health buddies. Yet, similar goal weight was not a significant predictor of network formation. Second, members' self-tracking activities did not help them to make more health buddies, which indicated that members did not necessarily select users who may serve as good models in self-management. Finally, social influence occurred such that members' weight management progress became similar to the average of their alters.

Online Networks SAT.AM1

Virtually Rich: The Social Process of Conspicuous Consumption in a Virtual Economy

Joshua Clark, USC Annenberg

Contact: joshuaac@usc.edu

Wealth has long been recognized as a fundamental social construct. Dating back to Veblen's studies of conspicuous consumption, the accumulation and display of luxury goods can be raised as a social signifier (1912). Displays of wealth and power influence the formation of social ties and other networking. However, the exact motivation behind consumption have remained open to debate. Some theorists argue that acquiring luxury goods is an activity that is primarily

undertaken by "snobs" who are attempting to set themselves apart from their immediate social network (Corneo & Jeanne, 1997). Others argue that goods take on a bandwagon effect, becoming more desirable the more people covet a product (Leibenstein, 1950). This paper attempts to disentangle this distinction by examining conspicuous consumption within the virtual economy formed by the popular game Team Fortress Two. By scrutinizing the number of in-game luxury items players have in relation to their ego networks, it is possible to illuminate the social dynamics underlying consumption. Initial results from a network of approximately 125,599 players linked by 472,168 friendships suggest that consumption is primarily meant as a form of display and social differentiation, serving to separate a player from their peers. Additionally, controlling for time and skill, players who consumed more luxury goods are more likely to occupy central positions within the in-game network and have more friends than their stingy counterparts.

Politics and Networks Structures SAT.AM1

Politics and Networks Structures SAT.AM1

Not every tie is created equal: a structural perspective on board interlocks and diffusion of strategic actions

Nai Wu, Texas A&M University

Contact: nwu@mays.tamu.edu

Research on diffusion through board interlocks has focused mainly on the dyad level, meaning the relations between a focal firm and its interlocked firm. The structural embeddedness of a firm on diffusion of strategic actions has received less scholarly attention. Drawing from the social network perspective, I first examine how the strength of an interlock can influence diffusion of strategic actions. In this paper, I specifically focus on mergers and acquisitions (M&As) in emerging markets as the strategic actions of interest. I then turn to the theory of triads in structural sociology and examine the influence of closed triads. I theorize that Simmelian ties formed in a closed triad facilitate diffusion. Next, I propose the influence of the number of cliques in which both the focal firm and its interlocked firm are embedded. I further theorize how sending board's eigenvector centrality and receiving board's closeness centrality can increase or decrease diffusion of M&As in emerging markets. The preliminary analysis shows that the number of cliques and sending board's eigenvector centrality positively predict a focal firm's M&As in emerging markets whereas receiving board's closeness centrality negatively predicts them. Thus, the preliminary results support most of the hypotheses. The theoretical perspective developed in this paper suggests that strategic actions are influenced by multi-level factors rather than being diffused through a single level.

Politics and Networks Structures SAT.AM1

"Battle networks" in the German parliament – Analyzing the opposition's coauthor network of written inquiries directed towards government

Thomas Metz, University of Freiburg, Department of Political Science, Sebastian Jäckle

Contact: thomas.metz@politik.uni-freiburg.de

Members of the German parliament may force government to publicly reply to a particular question by formally issuing a brief written inquiry (kleine Anfrage). Because of this feature, inquiries are especially popular with the opposition which uses them to openly pester those in power with uncomfortable questions, draw attention to the government's presumed failures

and at the same time vie for popular support. However, little is known about the structures within and among opposition parties that muster these public attacks on government. We exploit the fact that inquiries have to be signed by the authoring parliamentarians (and/or parliamentary groups) and – drawing on more than 3600 inquiries issued during the most recent legislative term 2009-2013 – construct a social network of the parliamentary opposition. Our approach extends the framework developed for bill-cosponsorship networks and allows us not just to shed light on how parliamentary groups cooperate and compete among each other in their opposition to government, on factions within the groups on who is ultimately responsible for conflict and who for cooperation. Categorizing inquiries by policy topic enables us to estimate how much parliamentary groups and single opposition members have specialized areas of expertise, how these areas are interlinked and to what extent individual members of parliament can shape the positions taken by their respective parliamentary group. Coupling our findings to elite-theory we may also ask whether and how much an individual's position within this “battle network” may be an indication of his or her chances to rise to an elevated position within a party.

Politics and Networks Structures SAT.AM1

An Experimental Study of Information Diffusion in Competitive Settings

Samara Klar, University of Arizona, Yotam Shmargad

Contact: klar@email.arizona.edu

To be persuasive, political campaigns all rely on one crucial element: the diffusion of their messages. Existing work demonstrates that social networks with high clustering – those in which one's friends are friends with each other – are the best settings in which to diffuse information quickly (e.g. Centola 2010). Given this work, campaigns hoping to disseminate information might assume that they are best-served to target high-clustered social networks. However, these studies overlook the reality of campaigns: competing sides attempt to diffuse their messages simultaneously. In such competitive settings, it is important to assess how quickly individuals are exposed to messages from competing campaigns. In two experiments, we construct online social networks and assign participants to either high- or low-clustered networks. We further manipulate the number of places in the networks where two competing campaigns can seed their messages. Participants receive links to any information to which their online connections have been exposed, thereby allowing information to diffuse throughout each network. We are thus able to compare the diffusion of information by large versus smaller campaigns in both high-clustered and low-clustered networks. We find that low-clustered networks expedite exposure to both of two competing messages. We furthermore demonstrate that, because lower clustered networks increase exposure to both sides of a competitive campaign, they provide underdogs with a higher relative share of exposure compared to their

larger competitor. Low-clustered networks thus decrease the inequity in message exposure brought upon by an imbalance in campaign resources.

Politics and Networks Structures SAT.AM1

Citizen Participation in Political Communication via Weibo micro blogging: A Case Study of Chief Executive Election of Hong Kong

Yupei Zhao, 146 Alexandra House, 47 Rutland Street, Leicester. LE11SS

Contact: yz134@le.ac.uk

The aim of the research is to examine the different ways of contributing to cyber social network-Chinese micro blogging Weibo, but focusing on the case study of Chief Executive Election of Hong Kong; topic discussion and topic orientation expression will also be highlighted in a quantitative way (content analysis) and qualitative way (discourse analysis). In some senses, representing the different degrees of citizen participation and measuring the extent and distributions of these over time could illustrate the nature and motivations of citizen participation in political communications. This research will not measure the specific level of democracy but will draw on the interactive model of theory of democracy in terms of agreeing with the views from Schudson (2004) and Astrom (2004), focusing on citizen information dissemination through online debate and discussions (Weibo) and efficiency of citizen participation to strengthen their citizenship (Schuler, 2004, Hague and Loader, 1999), thereby investigating the strengthening of civic society and the several participatory forms of citizenship. Analyzing different kinds of contributions in the political discussions of Weibo through content analysis and discourse analysis will help to generate potential targets for interview and potential questions to ask. The result of analysis demonstrates that forwards were the most popular type of contribution rather than comment or comment on comment, and there is a considerable gap between forwards were done by casual users rather than that by Weibo Got Talent or VIP of person, or VIP of organizations. Schudson, M. (1997), 'Why conversation is not the soul of democracy' in *Critical Studies in Media Communication*, 14: 4, 297 — 309. Astrom, J. (2004), 'Digital democracy: Ideas, intentions and initiatives in Swedish local governments' in *Electronic Democracy: Mobilisation, organization and participation via new ICTs*. Gibson, R.K., Rommele, A. and Ward, S. J. (eds), London: Routledge. Schuler, D. (2004), 'Reports of the Close Relationship between Democracy and the Internet May Have Been Exaggerated' in *Democracy and New Media*. Jenkins, H. and Thorburn, D. (eds) Cambridge, Mass: MIT Press. Hague, B.N. and Loader, B.D. (1999), 'Digital democracy: an introduction' in *Digital Democracy: Discourse and Decision Making in the Information Age*. Barry N. Hague and Brian D. Loader (eds). London: Routledge.

Politics and Networks Structures SAT.AM1

Networks of power – a social network analysis of the Chinese Communist Party's Central Committee

Franziska Keller, New York University, Department of Politics

Contact: fbkeller@nyu.edu

Social networks between the members of policy-making bodies play an important role in any country, and an analysis of that network can give us interesting insights and allow for predictions about appointments and policy outcomes. The Chinese Communist Party is no exception to this rule, as I show in this study. Relying on a database of the career paths and socio-economic background of Central Committee members provided by Shih et al (2012), I infer such an informal network by cross-referencing promotions and lateral transfers with service in the same administrative unit. An analysis of this network using exponential random graph models reveals homophily along common provincial origin and past (pre-1945) experiences. The network also is hierarchical, displays strong reciprocity, and a tendency for transitive ties, but few cycles. Different centrality measures (even when lagged by several years) as independent variables in an event history model predict whether a Central Committee member gets appointed to the Politburo and its Standing Committee. Using temporal ERGMs, I analyse the development of the network before and during the Committee's 5 year terms, and test hypotheses about the tie-forming strategies of its members.

Public Health Networks SAT.AM1

Public Health Networks SAT.AM1

Estimation of Contact Network Properties using Multiple Epidemic Data Sources

Nicole Carnegie, Harvard School of Public Health, Ravi Goyal

Contact: carnegie@hsph.harvard.edu

The properties of contact networks can have profound effects on both the spread of diseases and the effectiveness of control programs. Therefore, evaluating the relative merits of different HIV prevention and policy options requires precise information about these properties. We present a method to integrate data from multiple sources, i.e clinic data, behavioral surveys, and genetic sequences of pathogens, to estimate high-order properties of sexual contact networks that are critical in evaluating both the drivers of the HIV epidemic and efficacy of HIV prevention programs. We jointly model the contact and transmission networks and epidemic process using a Bayesian model, incorporating the network model of Goyal et al. 2013 and an SIIR epidemic model, which captures acute-phase dynamics important to the transmission of HIV, in order to estimate critical network properties, such as clustering, degree distribution, and degree mixing. We will discuss ways to assess the relative contributions of each data source to the precision of the resulting estimates of contact network properties as well as possible extensions to dynamic networks by allowing for the inclusion of information on migration and timing of relationships in order to capture the evolving process of partner change and mobility.

Public Health Networks SAT.AM1

Integrating services for HIV and family planning through network strengthening in Addis Ababa, Ethiopia

James Thomas, University of North Carolina, Heidi Reynolds, Christine Bevc, Xavier Alterescu, Ademe Tsegaye

Contact: jim.thomas@unc.edu

The service needs of people with HIV in low income settings are wide-ranging and provision within a community is often disjointed among a variety of providers. We sought to improve referral coordination for HIV and family planning with an organizational network approach. We conducted an organizational network analysis on two networks in sub-cities of Addis Ababa, Ethiopia. There were 25 organizations in one sub-city network and 26 in the other. In one sub-city, we sought to increase referrals through three network strengthening meetings. We

then repeated the network analysis in both sub-cities to measure any changes since baseline. We also quantitatively measured reported client service needs in both sub-cities before and after the intervention with two cross-sectional samples of face-to-face interviews with clients (459 at baseline and 587 at follow-up). The baseline referral densities in the sub-cities, "A" and "B", were 0.115 and 0.155. In the sub-city with the intervention (A), the referral density had increased by 55% at 17 months following baseline. In the control community (B), the density decreased 60% in the same period. Reported unmet client service needs also declined more consistently across services in the intervention community. This study is one of very few that includes quasi-experimental assessment of two networks, one with an intervention and the other a control; and assessment of the effect of network changes on service clients. Our study demonstrated that a modest network strengthening intervention can enhance service integration in the network.

Public Health Networks SAT.AM1

Multiplex dynamics: Friends, crowds, and sports, and their influences on adolescent substance use

Kayo Fujimoto, University of Texas Health Science Center at Houston, Tom Snijders, Thomas Valente

Contact: kayo.fujimoto@uth.tmc.edu

Adolescents live in multiple peer contexts and their friendships are situated within multiple settings. This study investigated the social mechanisms that explain the formation of multiplex peer networks composed of friendships, cognitive crowd identifications, and school-organized sports. The dynamics of these cross-network dependencies and their relations to adolescent alcohol drinking and cigarette smoking were examined using a two-wave longitudinal sample of 1,776 10th graders consisting of predominantly Hispanic/Latino adolescents in Los Angeles, CA. We employed an actor-oriented co-evolution model of one-mode friendship network and two-mode affiliation networks of crowd identifications and sports participation. The results indicated that effects of cross-network dependency were statistically significant. Adolescents identify with the same crowd that their friends identified with, and participated in the same sports in which their friends participated in overtime. Conversely, adolescents become friends with those who identified with the same crowds or participated in the same sports. As for more frequent drinkers, participation in many sports leads to the nomination of increasing friends. This study provides a more complete view of evolution of multiple peer relations, which could contribute to the design of more effective school-based substance use prevention programs.

Public Health Networks SAT.AM1

The Impact of Social Networks in Primary Care Teams on Health Care Utilization and Associated Costs for Alcohol Drinkers with Cardiovascular Disease

Marlon Mundt, University of Wisconsin School of Medicine and Public Health

Contact: marlon.mundt@fammed.wisc.edu

Background: Cardiovascular disease (CVD) is a pervasive public health problem, with a U.S. prevalence of 6.5%. Alcohol consumption increases the risk of cardiovascular morbidity and mortality. Primary Care (PC) team communication and social interactions may be of critical importance for delivering high quality care to alcohol-drinking patients with CVD. **Methods:** We surveyed 20 PC teams from 5 PC clinics in the Midwest, with 96% (N=110) participation. Subjects rated their dyadic relations with each clinic staff member on (1) face-to-face communication about patient care, (2) electronic communication via email or Electronic Health Records (EHR), (3) friendship, (4) advice, and (5) emotional support. Density, transitivity, and centralization were calculated from the sociometric survey data. In addition, we extracted (from EHRs) utilization counts (urgent care, emergency department, hospitalization) and associated costs for PC team panels of CVD alcohol drinkers (N=534 patients). The analysis used 3-level generalized linear mixed modeling (GLMM) to relate PC team social network parameters, utilization counts, and costs, while adjusting for patient-level (age, gender, insurance, co-morbidities) and clinic-level covariates. **Results:** A one standard deviation increase in friendship transitivity within the PC team was associated with a 79% (RR 0.12-0.40), 49% (RR 0.31-0.85) and 32% (RR 0.49-0.95) decrease in urgent care, emergency department, and hospital use, respectively, and a \$619 (95% CI: \$258-\$979) reduction in health-care costs. In addition, a one standard deviation increase in electronic communication centralization was associated with a \$638 (95% CI: \$350-\$926) increase in utilization costs. **Conclusions:** More socially inter-connected and less hierarchically organized PC teams are associated with less health-care utilization and lower associated costs for alcohol drinkers with CVD in PC.

Public Health Networks SAT.AM1

Using Network Analysis of Patient Referral Pathways to Guide Health Care Utilization Management Strategy

Joe Kimura, Atrius Health, Katherine Ognyanova, Amanda Beacom

Contact: joe_kimura@atriushealth.org

The ability to measure, understand, and proactively manage health care utilization patterns is a core competency of accountable care organizations. Unmitigated utilization of high-cost, low-

value health care providers can compromise the financial viability of risk-bearing health care organizations. The objective of this study was to leverage network analysis to identify targeted management strategies aiming to reduce non-preferred utilization. Two years of de-identified financial claims data (i.e., monthly files of all paid service claims incurred by patients) from a large multi-specialty medical group organization in Massachusetts were examined. From these data, a set of two-mode patient-by-physician networks and their one-mode physician-by-physician projections were constructed. The resulting graphs were used to infer patient flow and identify common referral pathways that individuals followed in accessing health care services from providers outside the focal organization. The study employed network metrics to identify key physicians and referral paths responsible for high levels of external utilization. Connections at the institutional and specialty level – as well as their implications for patient flow patterns – were also examined.

Social Networks in Clinical and Translational Science SAT.AM1

Social Networks in Clinical and Translational Science SAT.AM1

A network intervention on scientific networks: design and reactions

Raffaele Vacca, , Christopher McCarty, Mike Conlon, David Nelson

Contact: r.vacca@ufl.edu

The scientific network at a university can be thought of as a “collective” brain: Just like new connections between neurons develop learning and new ways of thinking in the brain, new connections between scientists develop innovation and new ways of doing research at a university. Creating such new connections means doing a network intervention, a notion that has traditionally been studied in the health sciences, but more rarely on scientific networks. We drew on Thomas Valente’s Science article on Network Interventions, and applied its distinction between network induction and network alteration to scientific networks. We argue that traditional ways of supporting and coordinating scientific research, for example by offering new funding opportunities, fall in the category of network induction: they stimulate interaction between actors who are already connected. On the other hand, what we propose is a form of alteration of scientific networks, which creates new connections that did not exist before. We explored this idea on the network of scientific collaborations on grants and publications at the University of Florida. We adopted several structural criteria to select unconnected dyads and triads of UF researchers, whose collaboration would potentially be successful and beneficial to the whole “brain” of the university scientific network. Finally, we carried out an online survey with the selected researchers to investigate their attitudes and views about actually collaborating. We discuss the results of the online survey, and what they suggest about the nature of academic research networks and the feasibility of scientific network interventions.

Social Networks in Clinical and Translational Science SAT.AM1

Application of Research Network Analysis (RNA) for Center and Training Grants

Susan Lyons, The University of AL at Birmingham
, Lisle Hites, Molly Wasko

Contact: lyons@uab.edu

The goal of most research center and training programs is to facilitate interactions among investigators and trainees. It is believed that increased interactions will improve research productivity. Therefore, one measure of success for grant-supported research programs is the assessment of the productive interactions that are facilitated between centers, faculty, trainees and faculty/trainees. The impact of these interactions is illustrated by social network analysis - which we have re-termed "Research Network Analysis". The actual impact of research efforts are evidenced by co-funded grants, co-authored publications, co-sponsored presentations and informal collaborations within the program. Added dimensions of impact include tie diversity, such as: mentoring ties, cross-disciplinary ties, and multi-ethnic and gender ties. Another advantage of Research Network Analysis is the ability to include non-human actors as nodes in the network, enabling the mapping of various cores technologies and resources within the research network. By combining center member nodes with core facilities, overlaps in scientific fields of interest are easily viewed and areas are identified for program improvement. In terms of methodology, the research impact/goal must first be determined with the center or program director. Then, questions are designed and administered via survey to members. Nearly 100% response rate has been achieved and data collected from all members. The data is compiled, formatted, analyzed and graphed for inclusion into the grant applications. We present examples for pre-doctoral and post-doctoral training grants, two center grants and a departmental analysis of faculty interactions. To date, three grant applications were funded and two others are pending.

Social Networks in Clinical and Translational Science SAT.AM1

CTSA Core Services Use: Examining the integration of services by users over time

Elizabeth Heubi, Center for Clinical and Translational Science and Training at The University of Cincinnati, John Kues

Contact: elizabeth.heubi@uc.edu

The Cincinnati Center for Clinical Translational Science and Training (CCTST) has been monitoring the services that it's researchers use in order to identify synergies among different cores. As part of our center's mission, we are focusing on integrating the work of our strategic

core areas to provide more comprehensive support for investigators. Using social network analysis, we have been tracking investigators' use of various core services over time to evaluate our efforts to coordinate services. Our data indicate that different services are predominately used by subsets of investigators and that some services are more integrated than others. We have seen increased use of multiple services by investigators over time.

Social Networks in Clinical and Translational Science SAT.AM1

How are we doing as a collaborative network? Measuring collaboration in a multi-institutional CTSA

Clara Pelfrey, Case Western Reserve University

Contact: clara.pelfrey@case.edu

The CTSA program was designed to overcome historical competition between institutions with well-established "silos" in order to speed medical research and improve health. As a collaborative of 5 independent institutions, the Clinical and Translational Science Collaborative (CTSC) of Case Western Reserve University is one of the most complex CTSA programs. Since the inception of our CTSC in 2007, we measured our internal connectedness longitudinally using social network analysis (SNA) to determine whether our CTSC demonstrates sufficient density to function as a true collaborative. We surveyed key core personnel regarding their levels of interaction and their understanding of the other CTSC cores. We also asked about substantive collaborations with our Ohio CTSA partners and with the consortium. Our results show that the CTSC network density between key core personnel has steadily increased from 0.23 at its inception to a current density of 0.93, which is strongly indicative of a dense internal network. During the past year, 10/13 cores collaborated with one or both of our Ohio CTSA partners and 12/13 cores identified collaborations with the Community Research Partners in Northeast Ohio. Our core personnel identified 46/61 (75%) national CTSA consortium sites with whom they had substantive collaborations. These results suggest that core-to-core collaboration and understanding has significantly increased during the first 5 years of the CTSC grant. Likewise, valuable substantive collaborations exist across our state and with a majority of the CTSA consortium sites, a trend that will help foster more rapid translation of medical discoveries into better health.

Social Networks in Clinical and Translational Science SAT.AM1

Using social networks to evaluate the impact of a CTSA on research at a university

Raffaele Vacca, University of Florida, Christopher McCarty, Mike Conlon, David Nelson

Contact: r.vacca@ufl.edu

Since 2009 the University of Florida Clinical and Translational Sciences Institute (CTSI) has offered numerous services of research support and coordination to the UF scientific community. Four years after its foundation, we analyzed data on scientific collaborations at UF to evaluate the extent to which the CTSI affected the university research network. We used data on grant co-participations and publication co-authorships to construct a longitudinal network of research collaborations within the university, and analyze its evolution over 2008-2012. Although limited to the university institutional boundaries, the UF collaboration network shows structural properties that are typical of scientific networks at larger scales, such as the emergence of a “giant” component opposed to a myriad of small disconnected research groups. The network is structured by institutional boundaries on campus, with most collaborations occurring within, rather than across, formal organizations like colleges and departments. Three main trends emerged in the evolution of the network and the CTSI role: (1) The overall cohesion of the network increased: in other words, the tendency to do research collaboratively grew at UF in the last four years. (2) According to the distribution of degree, closeness and betweenness centrality within and outside the CTSI, the Institute increasingly covered strategic positions in the network, by affiliating well-connected scientists and brokers among scientific communities. (3) According to both structural measures of transitivity and compositional measures of diversity, CTSI-supported research became increasingly interdisciplinary.

International Networks SAT.AM2

International Networks SAT.AM2

Applying longitudinal ERGMs to the analysis of international trade

Sara Gorgoni, University of Greenwich Business School, Alessia Amighini, Matthew Smith

Contact: s.gorgoni@greenwich.ac.uk

Network analysis offers many useful insights to the study of international trade, and recently many scholars have applied network analytical techniques to international trade data. One of the less explored paths taken in this literature is to fit models to the network. In this paper we estimate longitudinal ERGM models over two different years (2000 and 2012) and for two sectors with different technological content. We answer research questions related to the structural determinants explaining the observed international trade network. Do countries tend to establish trading relationships with countries belonging to the same region, or at a similar levels of economic development? Do forces which explain the observed international trade network differ for the two sectors investigated? We use Longitudinal ERGMs that allow understanding of how trade ties are developed and vary over time. In spite of the wide availability of longitudinal trade data, to the best of our knowledge no study has yet attempted to apply longitudinal ERGM to the study of international trade. We use import trade data from the UN Comtrade Database to build a binary and directed network, where nodes represent the countries and the ties reflect the trade flows among them. We use data from a high-tech (optical instruments) and a low-tech (furniture) sector. We include a number of exogenous covariates that may affect the tendency of countries to establish trade relationships. We discuss our results in the light of extant literature on international trade.

International Networks SAT.AM2

Network Influences on the International Diffusion of a Health Treaty

Thomas Valente, Keck School of Medicine, University of Southern California,
Stephanie Pitts, Kar-Hai Chu, Heather Wipfli, Kayo Fujimoto

Contact: tvalente@usc.edu

This paper takes a network approach to understand how treaties are diffused and adopted among nations. We analyze three WHO treaties that went into force in the past 10 years. All three treaties have been ratified by at least 70% of WHO member states. The three treaties: (1) FCTC; (2) Convention against Corruption; and (3) Convention on Persistent Organic Pollutants

have spread internationally over similar time periods and at approximately the same rate. The central research question we ask is: Do country and/or network characteristics predict the timing of individual country treaty adoptions? Our prior research showed that being connected to a global listserve communication forum (GloboLink) was associated with country ratification of FCTC. We extend that analysis by comparing general network measures of trade and communication with individual country ratification of the three treaties, and compare model estimates across various network specifications. We include an expansive set of country attributes in the analyses to determine if these variables affect policy adoption and/or susceptibility to network influence. The analytic strategy we propose estimates dynamic network effects using event history approaches. Our results have implications for understanding (1) the importance of public health law and policy can contribute to population health; and 2) how social networks influence the adoption and spread of health-related behaviors.

International Networks SAT.AM2

Global Deforestation Drivers Using Bipartite Network Analysis

Gabor Nyeki, Duke Economics, Nga Nguyen

Contact: gabor.nyeki@duke.edu

Track: Mixed Methods Studies Kaimowitz & Angelsen (1999) presents a foundational review of the deforestation literature up to the 2000s. Over the decade that followed, because of its global environmental impact, the drivers of deforestation have been the subject of intense research. There are many theories that describe what leads to deforestation and what attenuates it, and validating these theories is crucial for designing and implementing better environmental policy. This paper reviews the recent economic literature modeling after deforestation. Network analysis is a novel approach applied to literature review; through its lenses, we can see the outlines of a theoretical synthesis. By coding the drivers of deforestation identified in each paper in the sample, a bipartite network of these drivers is created, and projected into a network where two drivers are linked together if they are mentioned in the same paper. Tools of social network analysis applied to this network show a clear difference between policy papers and scientific papers on deforestation. The difference is found both at the network level (density, node count, path length), showing scientific papers have a broader view on possible theories of deforestation than policy papers, and at the node level, nodes with high centrality are different in the two networks. Clustering algorithms are also studied on this network of drivers to delineate different theories of deforestation that pertain to different geographical locations and different modeling techniques.

International Networks SAT.AM2

Using Big Data to Map Influence and Cooperation in International Relations

Ryan Kennedy, Northeastern University/University of Houston/Harvard University, Navid Dianati, David Lazer

Contact: ryan.patrick.kennedy@gmail.com

While the use of network analysis to study international relations dates back to the early 1970s, the data which has been utilized has well-known shortcomings -- they tend to be relatively static and coarse. Networks based on, for example, trade and alliances, are static in that they change very little year-on-year, even in the presence of large changes in inter-state relations (sometimes even war). Networks based on alliances and rivalries are coarse in that we are forced to treat very different types of network links as though they were the same (e.g. NATO vs. COPAX). We attempt to overcome some of these shortcomings using the Global Database of Events, Language, and Tone (GDELT). GDELT provides historic global event data on the relationship between states from 1979 to 2012. Combining this with well-established coding frameworks, we are able to analyze the level of cooperation and conflict between states in terms of their recorded actions toward each other. Our research presents a unique way to identify international macro-events, those with global significance, using instances of coordinated action against a third-party. Utilizing the presence of temporally correlated and substantively similar network links, we are able to better identify macro-events. We are then able to use these macro-events to analyze the degree of policy coordination between states and make inferences about the network structure of influence and cooperation in the international system.

Mathematical Models SAT.AM2

Mathematical Models SAT.AM2

The Weakness of Data on Dyadic Connections

Elisa Jayne Bienenstock, Georgetown University

Contact: ejb57@georgetown.edu

Network science seeks to provide insight about a broad range of phenomena by modeling the abstract structural properties of graphs. The availability of digital data on social transactions has motivated network scientists to apply their methods to social networks amid cautions that connection patterns alone may be inadequate to describe social systems. This talk demonstrates a fundamental limitation of analysis focused only on the connections between dyads by comparing this to the application of an alternative formal representation of structure used by social scientists, the characteristic function from N-person cooperative game theory, to three simple examples of exchange in a triad: positively connected, negatively connected and independent. The network representation for all three is identical yet the game theoretic representation easily distinguishes the three, demonstrating that network structure, as a low dimensional projection of the relationship structure, is insufficient for reverse engineering important structural features of even these simple relations. Furthermore, the inadequacy of the graph representation of our three elementary scenarios focused on a triad raises the question: under what conditions are data on the aggregated dyadic relations of large social systems with thousands or more nodes sufficient for extracting and interpreting social meaning?

Mathematical Models SAT.AM2

Beyond a known set of recipients in relational event models

Brian Godsey, RedOwl Analytics (Baltimore, MD)

Contact: brian@redowlanalytics.com

A popular approach to modeling communication events initiating from a set of actors is to consider an 'a priori' known (and/or fixed) set of potential recipients---often identical to the set of actors---and then to infer the desired parameters of a proportional hazards model via a multinomial logit distribution. However, if the set of potential recipients (the "risk set" in an actor-oriented model) is not known, or is too large or heterogeneous, this approach breaks down. In this paper, I present a method that addresses this problem by removing the necessity of a known risk set over which the 'a priori' probabilities are equal (uniform) and replaces it

with a prior probability distribution over the event statistics, which could be based on an estimated risk set if desired. This prior distribution can be designed in such a way as to allow for some previously-difficult actor choices, including: rare or unexpected events, for instance a never-before-seen recipient, as well as complementary or interchangeable recipients, for example an assistant receiving an email in lieu of his boss. The prior distribution can be constructed to give results (estimated parameters) identical to those of the standard methods in the case of a fixed risk set, as well as the case of a heuristic for determining the risk set. It is also possible to improve computational speed dramatically by using approximations or simplifications in generating the distributions.

Mathematical Models SAT.AM2

Online academic Social Networks: testing growth-models against closeness distributions

Angelo Corallo, University of Salento, Antonio Gentile, Laura Fortunato, Cristian Bisconti

Contact: angelo.corallo@unisalento.it

Random networks are a well-established paradigm, employed for interpretation of networked structures, belonging to several applications in complex systems. Huge research efforts are devoted to understand and model growth processes in this kind of networks. State-of-art papers focus essentially on the reproduction of some key features of the final (stationary) network: diameter, density, (normalized) number of subgraphs, degree and betweenness distribution. A number of competing models has been derived, each specifically addressing one (or more) of aforementioned features: Erdos-Renyi, Watts-Strogatz, forest-fire, Albert-Barabasi (AB), quoting only the most successful ones. In this paper, we test these models against the specific case of online directed social networks, referred to academic institutions. In particular we compare metrics' distributions of real and simulated data, at the ego-network level. As a first result, we observe how available models systematically: Succeed in reproducing degree and betweenness distributions (in form of power-law, indicating that our real data "almost" fit AB-like models for random network development), Though, cannot reproduce complex patterns, displayed by closeness distributions even when these networks are in a late growth stage. We discuss some preliminary results, indicating that this mismatch - between simulated and real data - can be solved by relaxing some oversimplifications in the models cited above. Particularly, the assumptions of i)time-independency of all the parameters introduced, and ii)linearity in the "preferential attachment" mechanisms. Concluding, we envisage how the interpretation of some topological characteristics of the network leads a path towards the development of novel models, for dealing with real-world random networks.

Mathematical Models SAT.AM2

Dimension reduction in multiplex networks: defining composite network measures

András Vörös, [University of Oxford](#); RECENS, Tom Snijders

Contact: andras.voros@nuffield.ox.ac.uk

Multiplex network data, information on several network layers in a given group, provides researchers an opportunity to study social processes in depth, and to answer questions about the interdependence of different relational dimensions. Although some multivariate network methods (e.g. ERGM, SIENA) make it possible to jointly analyse multiple network dimensions, modelling becomes impossibly complex when the investigation focuses on more than a few, say more than three or four, network layers. In these cases, dimension reduction methods may be applied to obtain a manageable set of variables. Drawing on existing statistical methods and measures, we propose a strategy to reduce the dimensions of multiplex network data measured in multiple groups. We achieve this by clustering the networks based on their pairwise similarities and constructing composite network measures as combinations of the items in each resulting cluster. The procedure is demonstrated on an example, the dimensions of perceptions about peers in Hungarian high-school classrooms. Starting from 24 perception networks, we arrive at a solution of three clusters which we label as positive traits, negative traits and social role attributions. Though our procedure does not rely on an explicit statistical model, it presents a useful and flexible approach for dimension reduction in multiplex networks. Following such an approach may aid researchers in defining complex network measures and may also provide some theoretical insights into multiplex social mechanisms.

Network Data Collection SAT.AM2

Network Data Collection SAT.AM2

Inferring Social Networks from Sensor Data

Momin Malik, Carnegie Mellon University, Juergen Pfeffer, Yuvraj Agarwal

Contact: momin.malik@cs.cmu.edu

Increasingly, sensors built into smartphones or in the environment constantly monitor people's physical states. Data automatically collected by sensors can prove a layer of information even richer than transactional data from online activity, making it interesting for scientific research. In this paper, we first provide a review of research that has used data from sensors to construct social networks (sometimes called 'social sensing'), and second present results of an experiment to test the quality of such sensor data. In the review, we discuss types of sensors (e.g., Bluetooth, GPS, microphones), what kind of data these sensors collect (e.g., relative proximity, absolute location, audio signals), technical and methodological challenges (e.g., noise and interference, inferring social networks from co-location networks), and some of the considerable ethical issues with such data. In our discussion of experimental results, we present estimates of how the limitations of sensor data, and the assumptions that go into processing the data, impact the quality and nature of inferred social networks. Our intention is to summarize and communicate the existing possibilities of using sensor data for constructing social networks (as much of the work has happened in engineering), and contribute our analysis of how sensor data compare to other sources and collection methods.

Network Data Collection SAT.AM2

Modular survey software designed for interactive, online/offline, tablet-ready field collection of network data

Jesse Fagan, University of Kentucky, Kate Eddens

Contact: jesse.fagan@uky.edu

When faced with complex set of ego-network data collections, affiliation networks, long rosters, or cognitive social structures, current survey software falls short. These surveys can also be fatiguing on the respondent. We have created internet-based, tablet ready software with touch screen capabilities that reduces fatigue and burden on the subject of network data collection and makes network data collection interactive and fun. The software utilizes modern technologies allowing dynamic and interactive visualizations, and incorporates fundamentals of simple and

compelling communication (e.g., plain language, color, drag-and-drop, card sorting) to make the experience accessible for technologically- and literacy-challenged populations. Questions can be optimized for touch screens for collection in the field using tablets, and allows for data collection without the need for a constant network connection. Survey development is intended to be entirely modular allowing the researcher to create new question types and methods of collecting data. Name generators and name interpreters can be used for egocentric network data collection, and roster systems can be inputted for sociometric data collection. Individual users can visualize their network at the conclusion of the survey, allowing addition or deletion of unintended links, and to provide interactive feedback to the participant at the point of data collection. The software will be released under an open source license allowing for contributions from a large community or modification of the software for special purposes. In this presentation, we will demonstrate the software and report usability feedback from participants in a pilot study using the data collection software.

Network Data Collection SAT.AM2

Untethering the ties: A case for a more nuanced concept of network connections.

Devan Rosen, Ithaca College, Kar-Hai Chu

Contact: drosen@ithaca.edu

Social network scientists have successfully deployed a myriad of operationalizations for the measure of a network connection, most frequently referred to as ties. More formal terms are often used, such as edge, but there is still a lack of an inclusive representation of the complexity of the concept. Referring to a network connection as tie doesn't contribute to an appropriate conceptualization of the phenomena. Further, the principle conceptualization of network connections as ties has led to a frequent conclusion of the key variable being the strength or weakness of a tie, compounding the problem by indicating some type of polarized, linear variable. As a result, much of the data collection and analysis has been fit to this conceptualization. We discuss a reconceptualization of network connections as multi-modal and multi-dimensional couplings, indicating the presence of potentials and kinetics (as in electric couplings), as well as torque limitations (as in mechanical couplings). We have previously referred to this reconceptualization as tie utility, and presented a taxonomy for application, but that work still included the tie concept. Key contributions of the continued reconceptualization now include elements of multi-modal and multi-granular analysis of social network couplings, combined with the previous multi-dimensional model.

Network Data Collection SAT.AM2

Utilizing Large Scale Archival Internet Data to Study Organizational Interaction

Matthew Weber, Rutgers University, David Lazer, Katherine Ognyanova, Allie Kosterich

Contact: matthew.weber@rutgers.edu

This research provides an update on HistoryTracker, a first-of-its-kind data extraction tool for extracting social network analysis data from the Internet Archive. The Internet Archive hosts the largest single record of the history of the World Wide Web from 1995 to the present, but there has historically been a lack of research-ready databases and tools available to the scholarly community to access and use these data. This presentation will outline the functionality of the tool, as well as a public interface for accessing newly established datasets. Data from this project provides significant information on the development of websites, attributes, and the evolution of content. Furthermore, this work demonstrates a framework for incorporating Internet Archive data into social science research. This work focuses on (1) designing clear research questions; (2) using the appropriate filters to select data; and (3) selecting appropriate methods for analysis. The validity of this approach is demonstrated through two use cases focused on hyperlink analysis, the first examining political interaction within the .GOV web domain, and the second demonstrating the growth of the online presence of Occupy Wall Street as a social movement, highlighting the potential of research conducted via the Internet Archive. Preliminary results provide insight into evolutionary patterns of organizational growth and interaction. In the long run, data from this research has the potential to fuel studies examining the evolution of personal narratives on the web, political discourse over the course of campaigns, the evolution of financial knowledge online and the evolution of news media.

Multidisciplinary Perspectives on RDS Inferences SAT.AM2

Multidisciplinary Perspectives on RDS Inference SAT.AM2

Advances in Model-Assisted Inference from Respondent-Driven Sampling Data

Krista Gile, Department of Mathematics and Statistics, University of Massachusetts, Amherst

Contact: gile@math.umass.edu

Respondent-Driven Sampling is type of link-tracing network sampling used to study hard-to-reach populations. Beginning with a convenience sample, each person sampled is given 2-3 uniquely identified coupons to distribute to other members of the target population, making them eligible for enrollment in the study. This is effective at collecting large diverse samples from many populations. Unfortunately, sampling is affected by many features of the network and sampling process. In this paper, we present advances in inference that adjust for many such features, which induce bias in earlier estimators. This talk includes joint work with Mark S. Handcock

Multidisciplinary Perspectives on RDS Inference SAT.AM2

Assessment of effectiveness of RDS sampling method in migration studies

Joanna Napierala, Centre of Migration Research, University of Warsaw, Agata Gorny

Contact: joanna.napierala@gmail.com

It is unquestionable that migrant groups belong to hard to reach populations (cf. Heckathorn 1997) due to their limited visibility in the destination country. The latter is caused by two main factors. Firstly, is the lack of or limitations of official registers in capturing the overall migrant population in the given country, especially foreigners with illegal status. Secondly, highly mobile migrants, especially temporary ones, travelling constantly between the sending and destination country are difficult to reach in the surveys. Consequently, the Respondent Driven Sampling (RDS) can be a powerful sampling method for reaching migrant population. Indeed, RDS became quite popular especially in European migration studies but also in the U.S. (cf. Tyldum, Johnston, Rodriguez (eds.) 2014). However studies that would asses effectiveness of RDS method versus other methods in migration studies have not been conducted until now. The goal of our paper is to fill that gap by assessing effectiveness of the RDS method versus quota sampling in migration studies. The latter is frequently applied in studies on foreigners since it

does not require the sample frame. We hypothesise that RDS is more effective and reliable than quota sampling method, especially while studying sensitive topics such as legal status of migrants, remittances and others. In our paper we also address the research question whether RDS samples differ systematically from quota samples. In the proposed paper we examine data from two surveys on Ukrainian migrants in Warsaw. They were conducted simultaneously with the use of RDS and quota sampling in 2012.

Multidisciplinary Perspectives on RDS Inference SAT.AM2

Assessment of multiple respondent driven sampling estimators under real and ideal recruitment conditions in an empirical population of female sex workers in China

Ashton Verdery, University of North Carolina at Chapel Hill
, M Merli, James Moody, Jeff Smith

Contact: ashton.verdery@gmail.com

We compare the performance of four respondent driven sampling (RDS) estimators under different sample recruitment conditions. We focus on the following estimators as they are referred to in the literature: RDS-1, RDS-1/DS, RDS-2, and the RDS-SS estimator of Gile (2011), a recently introduced estimator which has not yet undergone evaluation under conditions of preferential recruitment with empirical samples. Using data from two concurrent surveys of a hidden population of female sex workers (FSWs) in China, RDS and a venue-based sampling approach, we first generate most likely population social networks from which RDS samples are drawn using new case control network logistic regression models (Smith 2012) and an exponential random graph modeling framework (Handcock et al. 2008). We then stochastically simulate two types of RDS chains without replacement on these networks. In the first type, consistent with RDS theory, chains were simulated with respondents recruiting non-preferentially from among their social contacts, while in the second type chains were simulated with the preferential seeding and recruitment dynamics seen on the ground in the RDS study. We focus on how much bias and additional sampling variance is introduced when RDS chains diverge from the ideal case of non-preferential recruitment. Our results directly apply to the sampling of an epidemiologically relevant hidden population of female sex workers in the midst of China's modern STD epidemic. While prior work has found that violating RDS assumptions about non-preferential recruitment can significantly bias results and that ideal RDS chains can exhibit high sampling variance, these properties have not been compared across RDS estimators or assessed in relation to empirical levels of preferential recruitment in a hidden population.

Multidisciplinary Perspectives on RDS Inference SAT.AM2

Design-based Estimators for attribute-labeled, low-semidiameter subgraphs

Minas Gjoka, University of California, Irvine, Emily Smith, Carter Butts

Contact: minas.gjoka@gmail.com

In a large number of real-world applications it is common to represent systems, structures, or data using graphs, e.g. social graphs, web graphs, or biological graphs. Recent work has shown that counting the number of local subgraphs within such graphs can provide important insights and help us better understand them. In this paper we present unbiased techniques that efficiently estimate the frequency of subgraphs from a probability sample of egonets obtained from a graph by uniform or non-uniform independence sampling. Our approach supports the estimation of all spanning subgraphs containable in an egonet and does not require knowledge of the full graph. We propose two techniques: the first requires unique identification of alters in each egonet while the second does not require this information, making it suitable in settings with privacy sensitive network data or data collection limitations. Our techniques are flexible to support counting (i) subgraphs that are labeled by the attributes of the vertices within them (ii) induced or non-induced subgraphs (iii) undirected or directed subgraphs. Additionally, they are useful to estimate the frequency of subgraphs in a massive graph since they naturally decompose a large problem into many smaller problems that can be independently computed, hence making the estimation embarrassingly parallel. We use simulations to compare our estimators on a variety of real-world graphs and provide suggestions for their use. Last, we apply our methodology to an egocentric sample of Facebook users to estimate the clique size distribution and gender composition of cliques across the social graph.

Social Networks in Clinical and Translational Science SAT.AM2

Social Networks in Clinical and Translational Science SAT.AM2

The Duality of Learners and Assessments: a Network Analytics Approach

John Palesis, Virginia Commonwealth University, Manjul Nyachhyon, Richard Redmond,
Gerald Saunders, Deborah DiazGranados

Contact: japalesis@vcu.edu

One of the key objectives of learner assessment is to evaluate the mastery of course content and identify opportunities for future instructional improvements. In situations where multiple sections of the same course are taught, a common assessment serves to measure and compare content mastery across instructional styles and delivery media (e.g., in-classroom, online, hybrid). Assessment result analysis is typically based on standard statistical metrics such as mean, variance, standard deviation, and distribution of learner grades. This presentation illustrates how a network-analytics method can be applied to multiple-choice learner assessment results. Our method starts by constructing several two-mode learner-by-question networks representing content mastery from different perspectives (e.g., student correct or incorrect responses). From these two-mode networks, we then derive and analyze both the bipartite networks and the one-mode learner-by-learner and question-by-question networks to discover interaction patterns and gain useful insights that can be used to improve instructional content delivery and mastery.

Social Networks in Clinical and Translational Science SAT.AM2

A social network analysis assessment of grant collaborations

Deborah DiazGranados, Virginia Commonwealth University, School of Medicine, Nital Appelbaum, John Palesis

Contact: diazgranados@vcu.edu

In October 2006 the National Institutes of Health (NIH) launched the Clinical and Translational Science Award program. This program sought to transform the way in which biomedical research was conducted with the understanding that multiple organizational efforts are needed to address CTSA initiatives. To date, there are 61 medical research institutions that are working towards transforming the way research is being conducted. Such a complex program requires

an evaluation scope that incorporates a variety of methods. One methodology to assess this is social network analysis. A critical question to NIH and those institutions with CTSA is to understand how collaborations in contemporary research are becoming more multidisciplinary. Turning to the use of social network analysis, we apply SNA methods to understand research collaborations. The current research targets the assessment of collaborations in one of the 61 CTSA institutions with a focus on understanding network comparisons between funded and unfunded grants, and how interprofessional department collaborations have evolved over time since the implementation of the CTSA program. Moreover, we examine how under representative minorities are contributing to research collaborations, and the impact of geographic proximity.

Social Networks in Clinical and Translational Science SAT.AM2

Mapping the Growth of Transdisciplinary Partnerships over Time in a Large Scientific Initiative

Bobbi Carothers, Center for Public Health Systems Science, Washington University in St. Louis, Douglas Luke, Amar Dhand, Sarah Moreland-Russell, Cathy Sarli, Bradley Evanoff

Contact: bcarothers@wustl.edu

Recognition of the importance of interdisciplinary collaboration for fostering transdisciplinary science has grown. One objective of the Institute of Clinical and Translational Sciences at Washington University is to provide the infrastructure needed to support and enhance interdisciplinary research. To evaluate this objective, social network analysis was used to assess cross-disciplinary collaboration patterns in grant development teams and publication co-authorships. This study examined longitudinal data to compare collaboration patterns prior to CTSA funding with those during funding. Grant and publication data were used to compare collaboration from 2007 (before the award) with 2010 (grant) and 2011 (publication) patterns during the award. Grant information was obtained from the university's grants and contracts office, and publication data were collected using Elsevier's SciVerse Scopus. NIH specialty codes were used to categorize member discipline. Network analysis demonstrated a growth in cross-disciplinary collaboration over time. Change was assessed with modularity, where decreasing values indicated an increase in cross-discipline collaboration. The decrease in modularity was stronger for grants than it was for publications, which is expected given the lag time between grant submission and publication of results. The decrease was also stronger when focusing on those who joined in the first year than when including those who joined in subsequent years, which is also expected when including younger investigators who are under greater pressure to publish in their own fields. This research introduces a new way to examine change in cross-disciplinary collaboration over time and evaluate the effectiveness of support for this kind of work.

Social Support SAT.AM2

Social Support SAT.AM2

Multigenerational family networks that support healthy diets in children

Kayla de la Haye, RAND Corporation, Laura Koehly, Christopher Marcum, Ivanka Prichard, Amanda Hutchinson, Donna Hughes, Carlene Wilson

Contact: kayla.delahaye@gmail.com

Chronic disease prevention initiatives often promote healthy diets in children by targeting their parents (typically mothers). Parents play a central role in establishing healthy diets in their children through behavior modelling (i.e., parents' own food intake) and by supporting the intake of healthy foods (e.g., encouraging intake of, and facilitating access to, healthy foods). Although parent-child dyads are clearly important, health initiatives typically ignore broader family systems that may also shape children's diets. Qualitative research indicates that grandparents and other family members can play active roles in influencing children's diets, and that these processes may differ based on the structure and race/ethnicity of the family. This study examined the relationship between children's diet (both healthy and unhealthy food intake), and the diets and relationships that support healthy eating among three generations of their family members (N = 288, nested in 60 families). We report on how the diets of first, second, and third generation family members are associated with children's diets, and how structures of relational support for healthy eating within these multigenerational families are associated with healthy and unhealthy eating patterns in children. Race/ethnic differences in support networks, and how these relate to children's diet, are reported. Findings provide insights into how health promotion initiatives can harness broader family structures, beyond parent-child dyads, to support healthy eating in children.

Social Support SAT.AM2

Personal Networks, Communication Multiplexity, and Well-Being: An Examination of Networked Individualism among College Students in Singapore

Hua Wang, University at Buffalo, The State University of New York, Vincent Chua, Michael Stefanone

Contact: hwang23@buffalo.edu

The study is an ongoing examination of college students as networked individuals in the context of Singapore (N = 420). There are four aims for this project. First, we explore the major

characteristics of participant's personal networks through three structural attributes (i.e., size, density, and diversity) and two types of social ties (i.e., weak and strong). Second, we examine participants' communication patterns through measures of communication multiplexity (i.e., role, channel, conversation, activity, and goal multiplexity). Third, we analyze how the abovementioned personal network structures and communication patterns are related to participants' sense of well-being. Last but not least, we investigate the practices and strategies that participants use to activate their social capital within personal networks to seek help during challenging times. Data were collected from October 2012 to May 2013 from two major universities in Singapore through an online survey questionnaire. 74.9% were female and 25.1% were male; their age ranged from 17 to 36 with an average of 21.02 (SD = 1.64); 56.7% were freshman, 26.9% were sophomore, 5.8% were junior, 9.0% were senior, and 1.6% chose other; 78.0% were Chinese, 6.4% were Malay, 6.7% were Indian, and 8.8% chose other. The results of this study will provide critical empirical evidence of networked individualism in the context of Singapore and help identify significant indicators of personal network attributes and communication patterns as to how they are associated with individual's sense of well-being. In addition, this study will add new knowledge about effective network-based strategies for seeking social support.

Social Support SAT.AM2

Role of Media in providing Transnational Social support- A Structural Analysis of International Students' Networks

Rajalakshmi Kanagavel, University of Hildesheim

Contact: kanagave@uni-hildesheim.de

In the recent years, the research in the field of transnationalism has shown that national borders only pose barriers to a limited extent for interpersonal relationships. With the proliferation of technological advancements on an unprecedented scale, a new level of social connectedness allows one to disseminate news and stay connected to a global audience. Today with the help of communication media, people are informed that communities can consist of an individual's network of relationships, wherever such communities are located. This on-going research project analyses the personal communities of International students who are currently pursuing their studies abroad. This paper examines how different media structures both online and offline helps in maintaining social relationships and providing social support to the International students in their transnational networks using egocentric network analysis. Based on the network analytical support research with the data collected on the personal networks of International students who lead transnational lives abroad using a quantitative online survey, transnational integration pattern as well as factors affecting transnational social support in the context of mobility is analysed. Although transnationalism studies have acknowledged the importance of globalization technologies, there is a lack of research on how

different media structures are used in maintaining of transnational ties. As a small step towards fulfilling the gap, this research examines how International students maintain their transnational ties across borders when they are abroad and gain social support.

Statistical Methods SAT.AM2

Statistical Methods SAT.AM2

Approximating Network Measures for Large Scale Networks of Varying Size, Density, Typologies, and Subsampling Levels

Ju-Sung Lee, Carnegie Mellon University, Juergen Pfeffer

Contact: jooselee@gmail.com

Due to the time and resources incurred in computing network measures for large networks, it is practical to approximate these whenever possible. We present some approximation techniques exploiting any tractable relationship between the measures and network characteristics such as size and density. We find there exist distinct functional relationships between network statistics of "expensive" measures, such as betweenness centrality and centralization, and network density. We can then express the parameters as a function of network size. We employ non-linear regression to infer the parameters for density and their hyper-parameters for size. Sparse, but not too sparse, networks which admit sufficient entropy incur the most variance in the network statistics and, hence, more error in the estimation. We review our approach on several network topologies including random/Erdos-Renyi, small world, and scale free-networks. Finally, we examine these functional relationships for varying subsampling levels to determine the point (in subsampling and density) at which approximations become impractical.

Statistical Methods SAT.AM2

Structural Zeros in Networks

Phillip Bonacich, University of California, Los Angeles

Contact: bonacich@soc.ucla.edu

There are two kinds of zeros in network adjacency matrices: zeros that exist because a relationship that might have existed does not, as a matter of empirical fact, exist, and relationships that could not exist even in theory. The researcher may wish to create measures of centrality that distinguish between the two types of zeros – empirical zeros and structural zeros. For example, consider the centralities of researchers in a network of collaborative research or co-authorship. A tie cannot exist if one researcher died before the other became active. In another example, consider a tripartite network with three kinds of actors in which ties cannot exist between actors of the same type. For example, countries can vote for UN resolutions, UN resolutions can be supported by Inter-governmental organizations, and countries may

participate in inter-governmental organizations: one may wish to examine a network with all three types of nodes although the researcher lacks equivalent data on direct relations between nodes of the same type. The focus of this paper will be to develop a principled measure of eigenvector centrality when there are structural zeros. With eigenvector centrality (and with PageRank) the centrality of a node is a function of the centralities of its neighbors: a node is penalized if it is not connected to another node even if such a connection is impossible. A alternative measure of eigenvector centrality is proposed without this limitation that is both easy to understand and has good mathematical justification.

Statistical Methods SAT.AM2

Uncovering Social Structures

Douglas Hughes, Department of Political Science University of California, San Diego, Michael Davidson, Christopher Fariss

Contact: dhughes@ucsd.edu

The relationships that exist between social groups influence a variety of political and economic outcomes, however the measurement of these structures and their inter-relationships is difficult. In this paper we develop a model that is capable of uncovering the latent class structure of a society given the existence of identifiable social groups. First, we demonstrate the model performs as theoretically expected using simulated data. Second, we apply the model to experimental data from individuals living in central Chennai, the sixth most populous city in India. The model estimates parameters, which are readily interpretable as an ordering of caste sub-groups along a latent social dimension in India. Third, we validate the model predictions using out-of-sample data measuring within-group and between-group marriage ties in India. As this validation demonstrates, the model allows us to make predictions about the general formation of social network ties in India.

Statistical Methods SAT.AM2

Assessing the Effectiveness of GRAND in Facilitating Multidisciplinary Collaborations

Chang Zhe Lin, University of Toronto

Contact: chang.lin@hotmail.com

Using Exponential Random Graph Models (ERGMs), this paper investigates the extent to which efforts of a Canadian research network toward multidisciplinary collaborations (MDC) have been successfully carried out. More specifically, this paper investigates the extent to which collaboration configurations (i.e., transitive triads) have been formed between researchers with

different disciplinary backgrounds. This paper relies on data collected from GRAND, a federally-funded Network of Centres of Excellence supporting 34 major research projects (with more than 100 smaller sub-projects) divided into 5 cross-pollinating themes involving researchers at 26 Canadian universities. 124 researchers completed our survey and interview, during which they reported whether and with whom they have collaborated. In response to previously identified problems of MDC, such as cost of coordination, GRAND has implemented a series of measures to facilitate MDC. First, in addition to mere encouragement, organizers and management take an active role in facilitating researchers to work together. Second, a unified online forum makes it easy for researchers to share and report their knowledge. Finally, GRAND organizes annual conferences with the purpose of facilitating face-to-face meetings among researchers. However, whether these efforts have been successful remains uninvestigated. This is an important question to ask especially given the amount of resources that have been exhausted and also the innovative benefits of MDC. Using ERGMs, this paper first establishes collaboration configurations at the organizational level. Then, personal attribute data (identifying seniority as well as disciplinary backgrounds) will be entered to see whether collaboration structures actually involve people with different disciplinary backgrounds.

Words and Networks SAT.AM2

Words and networks SAT.AM2

A Critical Discourse Analysis of the Rhetorics of Agent Orange

Sarah Beth Hopton, University of South Florida, Jurgen Pfeffer, John Skvoretz

Contact: sb@sarahbethhopton.com

Between 1961 and 1971, a chemical byproduct of 2-4D and 2-4-5T, called dioxin, more commonly known as “Agent Orange,” was sprayed on more than 20 million acres of Vietnamese jungle in an effort to destroy tree cover that provided the North Vietnamese Army with military advantage. Given the uncertainty and disagreement over the science of Agent Orange, current political negotiations are largely won or lost based on the persuasiveness of ideas and the power of grounding values. In this paper we compare the US Congress, Vietnamese and US media's discourse about Agent Orange between 2006-2013. Methodologically, we use different approaches of text and correspondence analysis and compare their results. We apply fully and semi-automated approaches (e.g. text mining, correspondence analysis, network text analysis) as well as more cumbersome approaches of manually coding the texts. We discuss the advantages and limitations of the different approaches and discuss the ability of automated approaches to truly generate accurate themes/categories that have any linguistic value for critical discourse analysis projects.

Words and networks SAT.AM2

A Novel Method of Network Text Analysis with Application to a Sample of Contemporary Screenplays

Starling Hunter, **Starling Hunter** *Carnegie Mellon University* 5032 Forbes Avenue, Qatar Office SMC 1070 Pittsburgh PA 15289-1070 starling@andrew.cmu.edu

Contact: starling@qatar.cmu.edu

In this paper I describe a method of Network Text Analysis built upon an under-investigated lexical relationship—the co-occurrence of two or more etymological roots within the same word or phrase. I then apply this method to a sample of 104 feature-length screenplays—34 Academy Award-nominated, original screenplays; 34 nominees of other major film awards; and 34 unproduced, original screenplays randomly-selected from the “Simply Scripts” website. Comparative analysis focuses on (1) the structural properties of the screenplays’ text networks

and (2) the thematic significance of concept position within those networks. Regarding structure, I find that the text networks of Academy Award nominees have significantly more unique concepts and statements, both in the network as a whole and in the main component. Their networks are also significantly less fragmented. Regarding concept position, I find that screenplay's most obvious themes are most strongly evident among nodes with lower constraint values. For example, "Zero Dark 30" was nominated for best original screenplay in 2012. The story centers on the decade-long hunt for Osama bin Laden and his death at the hands of SEAL Team 6. Statements associated with the least constrained nodes include: American Embassy, bulletproof, CIA, cover story, headquarters, high-risk, high-value, high-tech, hijacker, HUMVEE, inner circle, instant message, lasers, LZ (landing zone), Middle East, mid-level, money man, NSA(National Security Agency), National Security Advisor, night-vision, OPSEC(Operational Security), QRF (Quick Reaction Force), radar, SEAL, security guard, sound-proofed, Station Chief, superpower, top-secret, US, West Point, vantage point, and video recorder.

Words and networks SAT.AM2

Construction and Analysis of Hadith Networks: World's Oldest Social Network

Muhammad Ahmad, Department of Computer Science University of Minnesota

Contact: mahmad@cs.umn.edu

Using primary sources in Arabic from historical texts from the second and third century of Islam (8th-9th century AD) we reconstruct a social network of transmitters of narrators. A social network of more than 1,000 actors is constructed using these sources. A number of network measures e.g., Centrality, PageRank, Betweenness etc are computed on this network and it is revealed that these measures do in fact correspond to people who are known to be famous. In addition to these some surprises are also revealed e.g., some actors have high number even though they are not as famous but they have indirect influence. Lastly we also show that analysis of this type of analysis can reveal insights about Islamic history which may be missed by more traditional methods of discourse and analysis.

Words and networks SAT.AM2

From media reporting to international relations

Chun-Hua Tsai, School of Information Sciences, University of Pittsburgh, Yu-Ru Lin

Contact: cht77@pitt.edu

Network analysis has brought new perspectives in studying emergent power in international relations. Prior work on networks of international relations has mostly relied on data derived from formal alliances and trade flows, which can hardly capture the rapidly evolving international relations due to globalization and recent advances in information technology. In this project, we propose a novel research design that aims at capturing “real-time” international relations through news reporting. We collect worldwide news on a daily basis, and characterize the relationship between any two countries through analyzing the flow and the similarity of their news content. We have tested our framework on news articles about the APEC (Asia-Pacific Economic Cooperation) CEO Summit Indonesia 2013. Our empirical results suggest that the content similarity between the participating countries’ new articles reflect the structure captured by international trade flows, but also capture emergent relationships and roles in these countries. Our initial finding also has important implications for analyzing online media corpus for understanding underlying social and political changes on a global scale.

Comparing Climate Change Policy Networks SAT.PM1

Comparing Climate Change Policy Networks SAT.PM1

Core Issues and Conflicting Priorities in Climate Change Mitigation: A Netfield Analysis of Global Discourse

John Sonnett, University of Mississippi

Contact: john.sonnett@gmail.com

Despite international agreements to reduce global greenhouse gas emissions, total emissions have climbed rapidly following the "worst case" trajectory. Actual national priorities have evolved in tension with emerging global (UNFCCC) norms that urge strong national mitigation. This paper analyzes the global field of climate change discourse as composed by national framings and priorities. The data come from Comparing Climate Change Policy Networks-a comparative study of 16 societies. Content analysis of major national newspapers indicates increasing global coverage of climate change since 1997, but very different mitigation debates, concerns and policy (non)responses. Core issues and conflicting priorities are identified in a two-mode matrix of nations and issues using netfield analysis, a combination of network and field analysis. Betweenness centrality highlights domestic impacts, general mitigation measures, and alternative energy as core issues bridging between nations. Correspondence analysis identifies three major "fault lines" in the discourse field: energy security versus environmental impacts and burden; science versus Kyoto Protocol and targets; and effects on economy. These conflicting priorities reveal the institutional bases of division underlying climate change mitigation discourse.

Comparing Climate Change Policy Networks SAT.PM1

Coalition network dynamics in Swiss climate change policy: From environmental to energy-centered political discourse?

Christian Hirschi, Swiss Federal Institute of Technology ETH Zurich

Contact: christian.hirschi@env.ethz.ch

In this paper, we map the political discourse on national climate change policy in Switzerland and investigate the formation of coalitions and their dynamics over time using the Discourse Network Analyzer (DNA). Swiss climate change policy is an interesting case for investigating coalition formation and coalition change since the policy has traditionally been shaped by typical environmental policy divisions between political left- and right-wing coalitions, with

centrist parties mediating between the two poles. With the intensifying wider political discourse on a new orientation of Swiss energy policy as a consequence of the Fukushima nuclear disaster, new dynamics in Swiss climate change discourse coalitions can be observed. We examine the key policy issues that lead to these political dynamics and analyze the resulting actor networks around those issues.

Comparing Climate Change Policy Networks SAT.PM1

Comparing Climate Discourse Networks across Cases

Jeffrey Broadbent, Department of Sociology University of Minnesota

Contact: broad001@umn.edu

The project on Comparing Climate Change Policy Networks includes 19 societies and several comparative analyses. This paper compares two-mode networks of discourse about climate change in major newspapers and the actors cited in the papers for and against a particular stance on climate change (for 2007-8). These two-mode networks display different top issues in the respective discourse sphere and different types of actors cited as being for or against these issues. This analysis provides a doorway into improved understanding of the complex political processes around the mitigation of greenhouse gas emissions in different types of emitting countries.

Comparing Climate Change Policy Networks SAT.PM1

The Climate Change Policy Network in Japan: A Tug of War between the Ministry of Environment and the Ministry of Economy Network

Keiichi Satoh, Hitotsubashi University, Tomoyuki Tatsumi

Contact: ksatoh2006de@mercury.ne.jp

The purpose of my presentation is to show the policy network structure of Japanese climate change policy based on our questionnaire survey of major organizations involved in policymaking. We conducted the survey of 72 out of 126 organizations between February 2012 and July 2013. While most European countries such as UK and Germany have introduced an emission trade system and green tax as major mitigation policies, Japan's mitigation policy mainly depends on voluntary action in the industrial sector and purchase of emission credits as stipulated in the Kyoto Treaty. The policy network is one of the important factors explaining these differences. Because climate change policy requires expert knowledge as well as actual action by industries and households to reduce greenhouse gas emissions, how the information and support networks are formed makes a significant difference for the national mitigation

policy. According to our results, the Japanese climate change policy network has two important features. First, the structure of the policy network suggests that there is a chance that the new policy measures such as green tax and Feed-in-Tariff can be discussed as the policy agenda because environmental policy promoters such as NGOs are tightly embedded in the Ministry of the Environment (MOE) network. Secondly, the Ministry of Economy, Trade and Industry (METI) is more powerful than the MOE network in terms of the power structure. Therefore, the policies that are favorable for the METI network members tend to be implemented more often than those favorable for the MOE network members.

Comparing Climate Change Policy Networks SAT.PM1

Climate Change as Discourse in the Irish Newspaper Media: A Social Network Analysis

Diane Payne, University College Dublin, Paul Wagner

Contact: Diane.Payne@ucd.ie

Climate change is perhaps the greatest threat to this planet and to our current way of life. Ireland's response to the challenges arising from this fact has been mixed. This paper is the first in-depth investigation of how Irish newspapers have framed the issue of climate change. This study analysed three of Ireland's most important and influential newspapers in order to generate data on the quantity and the content of the coverage that they have given to the issue. The analysis shows that there was an almost steady increase in the amount of coverage between 1997 and 2009, and that since then the amount of coverage has fallen significantly. It also found that climate change was primarily framed as a problem that required policy-makers to devise instruments that either obligate or incentivize economic interests to make eco-efficiencies in their production processes. Leifeld's discourse network analysis approach (Leifeld 2011) was used in order to code all the statements made by actors. The issue networks derived from the data illustrate how the problem was defined and how Ireland's national response to climate change was discussed. An analysis of the statements made by those whose views were given space in the Irish newspapers found that the discourse of ecological modernization was used to reconstruct the issue as a technological and economic challenge rather than an environmental problem. The use of ecological modernization discourse has enabled those with institutional and economic power to appear to be addressing the problem without substantially altering the current economic or political status quo

Inter-Organizational Networks SAT.PM1

Inter-Organizational Networks SAT.PM1

Evaluating the Effectiveness of Inter-organizational Collaboration Networks: A Case Study on Nonprofit Business Federations in Turkey

Nazli Aytug, Gediz University, Vener Garayev

Contact: nazli.aytug@gediz.edu.tr

Federations are multi-organizational forms, through which multiple entities collaborate to work together toward a shared purpose. As an inter-organizational network, the effectiveness of federations depends not only on achieving the individual goals of member associations, but also the goals of the network as a whole. Achievement of those network goals, in turn, is determined by various structural, functioning, and contextual factors. This paper analyzes those factors in light of inter-organizational collaboration networks of 12 nonprofit business federations and their 60 member associations in Turkey. The effectiveness of these inter-organizational networks was assessed using UCINET social networks analysis software based on survey data collected from member associations and federations both at the organizational and network level. The results show how structural, functioning and contextual factors affect the level of network effectiveness in nonprofit business federations. Recommendations are made in regard to how to increase the effectiveness of such collaboration networks in order to achieve desired goals in nonprofit federations.

Inter-Organizational Networks SAT.PM1

Interorganizational Social Capital: Examining structural hole, closure, and cupid constrained choice models of INGO collaboration networks

Nina O'Brien, California State University, Los Angeles, Andrew Pilny, Yannick Atouba, Michelle Shumate

Contact: nobrien2@calstatela.edu

Current literature on interorganizational social capital presents two apparently conflicting models of how organizations build social capital: (1) the closure argument which states that organizations create social capital through networks of strongly interconnected actors, and (2) the structural hole argument which states that organizations create social capital by brokering connections between otherwise disconnected organizations. In this study, we examine a third argument, the cupid or constrained choice model, in which brokers act as matchmakers to knit

third parties together (Stephens, Fulk & Monge, 2009). We empirically test these three alternative social capital models by longitudinally examining collaboration patterns among 515 international nongovernmental organizations (INGOs) dealing with a variety of issues including children's rights, sustainable development, HIV/AIDs, and women's rights from 1986-2004. Data were obtained from volumes of the Yearbook of International Organizations. To test the three hypotheses, we use separable temporal exponential random graph modeling (STERGM) to test the effects of (1) closure, (2) structural holes, and (3) common cupid organizations. To account for time heterogeneity, we run STERGMs on the formation of ties every two years. Our preliminary results suggest that the formation of new ties is more likely to result if it contributes to the closure of common collaborators. The formation of new ties was only marginally impacted by common cupids, and not affected at all by structural holes. Moreover, preferential attachment also strongly influenced the formation of new collaboration ties. Implications for theories of interorganizational social capital, collective action, and INGOs are drawn from the results.

Inter-Organizational Networks SAT.PM1

Seeking Innovation: Comparing Leadership and Expertise Interorganizational Networks Among Public Broadcasting Organizations

Sandra Evans, University of Southern California, Bei Yan, Leila Bighash, Kristen Guth, Christina Hagen, Yao Sun

Contact: sandra.evans@usc.edu

This study analyzes how leadership and expertise inform digital innovation in interorganizational networks of public media organizations. In the U.S., the mission of public broadcasting is to provide regional communities with programming that is underrepresented on commercial media, such as local news and educational content. Media fragmentation, new competitors, such as Pandora, and limited support from the federal government have forced public media organizations to reach for audiences across media platforms. In response, organizations have made greater investments in multimedia, and increased interest in interorganizational partnerships. This study asks: How are interorganizational networks used by public media organizations to support innovation in digital media content? To address this question, we ask, which entities are viewed as leaders in digital media innovation? And, which entities are viewed as experts? How do these expertise and leadership networks compare? And, are media organizations collaborating differently with experts or leaders? A theoretical framework stemming from literature on leadership, governance, and innovation in interorganizational networks is applied. Survey data from 139 U.S. public media organizations have indicated that almost two-thirds of respondent organizations were less than satisfied with their online presence, and many indicated a low commitment to online news content. Using QAP correlation analysis, we compare three types of interorganizational networks: leadership,

expertise, and collaboration. We argue that expertise networks reflect informal ties between organizations that inform innovation. Leadership networks differ from expertise networks in that leaders are not necessarily sought for advice or for collaboration, and therefore have less impact on innovation.

Inter-Organizational Networks SAT.PM1

Social Capital Divide: Exclusion from the Environmental Coalition Network in Global Civil Society

Aimei Yang, University of Southern California, Wenlin Liu, Kristen Guth, Kristen Steves, Rong Wang

Contact: aimei.yang@usc.edu

This paper examines how institutional factors affect NGOs' social capital, which, in this paper, is conceptualized as the accessible resources generated through NGOs' cross-sector alliance network with corporations. Social capital could facilitate organizations' access to information, status, and legitimacy. As one of the most popular sociological concepts, social capital is often perceived as a cure-all for social issues (Coleman, 1990; Putnam, 1993). Nevertheless, little attention has been directed to the uneven distribution of social capital among civil actors at the international level, nor are the mechanisms driving such disparity explored. This paper draws upon the World System Theory (WST) (Wallerstein, 1980) to examine how global stratification rooted in social and economic inequality may influence the access to social capital for organizations originated from different countries. Specifically, WST assumes that the world system is a connected international network, and it has three structural positions: core, semi-periphery, and periphery. The global stratification is likely to manifest in international communication and civil society. The hyperlink network data among the Global Fortune 500 corporations and 441 environmental INGOs were collected. Social capital was measured according to network features. Models of core/periphery structures are fitted to the data to identify the groups of densely-connected core nodes and sparsely-connected periphery nodes. Classical WST variables such as world system positions and economic development, and NGOs' attribution variables are regressed on global civil actors' social capital. The findings will extend social capital research, and offer a critical understanding of the power dynamics in the global cross-sector alliance network.

Inter-Organizational Networks SAT.PM1

The Role of Multiconnectivity in Interorganizational Collaboration over Time

Wenlin Liu, Annenberg School for Communication University of Southern California, Amanda Beacom

Contact: wenlin.liu@usc.edu

Although interorganizational relations often take the form of multiplex ties, multiconnectivity is generally less examined as a source of interorganizational collaboration. Using a multitheoretical analytic framework, this study examined how a set of endogenous and exogenous factors influence organizations' collaboration decisions over time. Specifically, we hypothesized that organizations with multiplex interorganizational ties were more likely to attract collaboration partners than those with uniplex ties only. In addition, the roles of network centrality, homophily by organizational type, and prior collaboration were also tested. We examined four consecutive years of interorganizational network data from a community health coalition in which three types of interorganizational ties—communication, expertise-sharing, and collaboration—were gathered from a total of 57 organizations. SIENA was used to assess the effects of multiconnectivity, multiplex network position (indegree centrality in three interorganizational networks), prior collaboration, and the homophily effect by organizational type in predicting the likelihood of collaboration over time. Our results suggest a strong multiconnectivity effect on interorganizational collaboration over time, where the dyads of organizations connected in communication and expertise-sharing networks were more likely to also form and sustain collaborative ties. In addition, we identify a nuanced recency effect associated with the role of prior alliances—that is, only the most recent collaboration is found to predict the likelihood of future collaboration. Finally, our results confirm an organizational type-based homophily that has been consistently found in literature.

Mixed Methods Studies SAT.PM1

Mixed Methods Studies SAT.PM1

Community Structure in Narrative Networks: Understanding The Case the Afghan Mujahideen through Network Analysis of Texts

Joseph West, University of Arizona, Ronald Breiger

Contact: ajosephwest@gmail.com

In this paper, we introduce an innovative network method for analyzing narratives of insurgency conflict, called Multiple Narrative Analysis (MNA). We coded historical narratives of the conflict for relations among people, groups and events to generate a three-mode network of the ecology of the Afghan insurgency during the Soviet occupation of the 1980's. We then apply a recently developed community finding algorithm to the collected data. The widely used algorithms of Newman and colleagues (Girvan and Newman 2002; Newman 2006) have recently been extended to apply to multi-mode data (Melamed, Breiger and West 2012). By applying the multi-mode extension of the Newman algorithm to the three-mode network data, we show how formal network methods can complement narrative analysis and enrich historical understanding of cases. We present two findings, one methodological, and one substantive. Methodologically we show how structural representations of narratives of insurgency can be more or less beneficial to analysts, depending on the focus of the narratives and the research questions of the analyst. Substantively, we show how the relationships between two important insurgent groups, and their primary source of resources (the Pakistan ISI) can be understood to be driven by their connection within the narratives, to particular kinds of events.

Mixed Methods Studies SAT.PM1

Comparing Media Policy Networks: A Cross Country Exploration of Structure and Influence

Ivory Mills, Northwestern University

Contact: imills@u.northwestern.edu

This research applies social network analysis to media policy networks and will serve as one component of a larger mixed methods project that utilizes social network analysis and qualitative comparative analysis. The motivation for the project is to understand how media policy networks influence media development policy outcomes in different country settings. To do this, I will seek to answer questions about policy network structure and network change. The nodes in networks are organizations and the ties are formal communication materials such as

policy documents, white papers, mandates, and press releases. I will employ a dialectical approach to analyze media policy networks of four countries and use these networks as explanatory variables, looking at the actions and constraints of both structure and agents in an iterative process. This is especially important in policy networks because political and economic factors impose constraints, historical and systematic legitimacy plays a role, network and actors behaviors are patterned by these exogenous factors. In this vein, I will look at actor attributes, with theories of homophily, proximity, structural holes, and agenda setting in mind to understand these media policy networks. This research utilizes social network analysis to further theoretical understanding of media policy, network science, and international relations.

Mixed Methods Studies SAT.PM1

For the love of homophily - A mixed-methods approach to understanding relationships in feminist music worlds

Susan O'Shea, Mitchell Centre, University of Manchester

Contact: susan.oshea@manchester.ac.uk

Ladyfest, as a feminist social movement acts as an intermediary in cultural production spaces, where music focused artefacts are made, collaborations forged, distribution networks established and reception practices enacted to create new conventions which can be understood as feminist art worlds. The growing literature on gender and cultural production, particularly in music communities, frequently speaks of networks in qualitative narrative terms. However, very little is known about the organisational structure of Ladyfest as a feminist music world and the types of relationships forged within those organisational structures. This paper draws on a UK based case study to examine the role of homophily in feminist cultural organisational spaces. The main topic of discussion will focus on the role of sexuality in Ladyfest friendship and collaboration networks. Ladyfest as a feminist movement is often perceived by non-participants to be dominated by lesbians and closed to male participation. On the other hand, Ladyfest participants aim to challenge heteronormative cultural practices, where heterosexual relationships are prioritised, and tend to embrace the notion of diversity. Ladyfest participants show an awareness of intersecting inequalities such as ethnicity, class and disability yet homophily plays an important role in developing relationships within the networks. Data is drawn from a project that employed novel participatory mixed-methods social network analysis of the role of networks in building and sustaining feminist art worlds. Primary data sources include on-line social media, surveys, documents, focus groups and multi-media interviews all of which contribute to an understanding of the importance of sexuality in feminist spaces.

Mixed Methods Studies SAT.PM1

Surviving Disruption Through Resilient Networks

Ziad Matni, Rutgers University, Marya Doerfel, Matthew Weber

Contact: zmatni@rutgers.edu

Most, if not all, organizations require interorganizational communication and management of information for their success. These are amplified in importance for organizations trying to stay in touch with one another during a disaster event; in fact, they play into the very survival of disaster-struck organizations (DSO) (Doerfel, Chewning, & Lai, 2013). We explore the organizational mechanisms behind this dynamic and study what happens when severe disruptions, such as disaster events like hurricanes, earthquakes, or wars, engulf these organizations. Our data looks at organizations affected by Superstorm Sandy on October 2012, specifically in the town of Asbury Park in New Jersey. In our analysis, we will rely on evolutionary theory in the realm of organizational networks as the framework to look at the fitness of organizational links. According to Monge, Heiss, & Margolin (2008), there are three main components to evolutionary theory that are seen as advantages over other views: it allows for the examination of the evolution of organizational populations, it explores the role of resource niches, and it provides a generalized, dynamic theory of change. We will explore evolutionary theory and its three main components, tying it in with concepts of organizational networks, organizational populations and communities, and the importance of structural inertia and its role in the transformation of organizations. Preliminary network analysis will be based on longitudinal data extracted from the Internet Archive, paired with survey data collected in the wake of Superstorm Sandy. Initial findings provide insight into organizational resilience in the wake of a major disaster.

Multidisciplinary Perspectives on RDS Inference SAT.PM1

Multidisciplinary Perspectives on RDS Inference SAT.PM1

A comparison of respondent-driven and venue-based sampling methods: consistency across repeated samples of two populations in 18 U.S. cities

Cyprian Wejnert, CDC, Michael Spiller, Gabriela Paz-Bailey

Contact: dwy7@cdc.gov

Respondent-driven sampling (RDS) is a widely used research method for sampling hidden populations. Previous studies have compared RDS to simple random sampling (SRS) and have documented differences in sample composition produced by RDS and alternate methods for reaching hidden populations, such as venue-based sampling (VBS). The ability to reach the same population in repeated surveys (reproducibility) using these sampling methods has not been evaluated. This analysis assessed the reproducibility of serial samples obtained with RDS and VBS as part of CDC's National HIV Behavioral Surveillance System. Data were collected from men who have sex with men in 14 cities in 2005 and 2008 using VBS and injection drug users (IDU) in 18 cities in 2006 and 2009 using RDS with a target sample of 500 participants in each city in each year. The mean attained sample size for each city each year was $n=614$ for VBS and $n=512$ for RDS. We correlated year 1 and year 2 sample characteristics by city for variables not expected to change within the target populations across years (black race, age 30-39, high school education, ever had an HIV test, ever in drug treatment, bisexual orientation, and male gender (IDU only)). Aggregate R^2 values were calculated as a measure of reproducibility for each sampling method. Our results suggest both methods produced similar samples in year 1 and year 2 (VBS: $R^2=0.95$; RDS: $R^2=0.91$).

Multidisciplinary Perspectives on RDS Inference SAT.PM1

Comparing Respondent-Driven Sampling Point and Variance Estimators for Studies of Injection Drug Users in the United States

Michael Spiller, Division of HIV/AIDS Prevention, National Center for HIV, Viral Hepatitis, STD and TB Prevention, Centers for Disease Control and Prevention, Gabriela Paz-Bailey, Cyprian Wejnert

Contact: MSpiller@cdc.gov

Respondent-driven sampling (RDS) is a common method for sampling hard-to-reach populations such as injection drug users (IDU). Its popularity stems from two factors: its effectiveness at accessing hard-to-reach populations and the availability of RDS statistical estimators intended to produce unbiased point and variance estimates of population characteristics. Multiple RDS estimators have been proposed, including the RDS1 (Heckathorn 2007), RDS2 (Volz and Heckathorn 2008), Successive Sampling (Gile 2011), and Model Assisted estimators (Gile and Handcock 2011). This paper systematically compares these estimators by applying each to variables from the CDC's National HIV Behavioral Surveillance System (NHBS) study of IDU in 2009. NHBS consists of 20 simultaneous RDS surveys in large urban areas that use an identical survey instrument and protocol. We find that the point estimators differ from the sample characteristics by an average of 3.8 percent, but that they are largely consistent with one another, with average pairwise differences of 0.6 percent. We also find that the Successive Sampling (SS) and RDS1 standard errors are highly consistent, with an average ratio of the SS to RDS1 standard errors of 0.99. In contrast, the Model Assisted standard errors are approximately twice as large as those from the RDS1 and SS estimators. These findings suggest that RDS-adjusted point estimates are largely insensitive to the choice of estimator for U.S. studies of IDU in large urban areas. More research could help to determine which of the RDS variance estimators best reflects the true sampling variability of RDS.1

Division of HIV/AIDS Prevention, National Center for HIV, Viral Hepatitis, STD and TB Prevention, Centers for Disease Control and Prevention, Atlanta, Georgia, United States of America

Multidisciplinary Perspectives on RDS Inference SAT.PM1

RDS Peer Recruitment Decision Making, Street Recruitment Dynamics and Opportunities for Statisticians

Jianghong Li, Institute for Community Research, Gayatri Moorthi, Thomas Valente, Hee-Sung Shin, Debarchana Ghosh, Chinekwu Obidoa, Margaret Weeks, Heather Mosher, Robert Heimer, Eduardo Robles, Greg Palmer

Contact: jianghong.li@icrweb.org

Respondent Driven Sampling (RDS) has gained its popularity internationally for its cost effectiveness in reaching hidden populations and claimed ability to make unbiased population estimates. However, RDS inference models were based on strong assumptions regarding peer recruitment processes and the structure of underlying social networks, which have not yet been empirically scrutinized. A mixed method intensive social network study is being conducted in Hartford, CT to recruit an atypical RDS sample of 500 injection drug users (IDUs). Comprehensive social network surveys before and after actual peer recruitment, location information, as well as 60 in-depth interviews will be analyzed to assess IDUs' peer recruitment intentions, actual experiences, and real world contextual factors associated with coupon distribution and return success. Ego-network analysis results do not support random peer recruitment assumptions. At the planning stage, IDUs intended to consider people they injected drugs with, but not those who injected at public locations or people they lived with. However, successful coupon distribution was more likely to happen with alters who i) provided ego support, ii) lived with ego in the past, iii) injected with others but not those inject with the ego. Nearly half of the successfully distributed coupons were re-distributed on the street before returning to the study site. Sociometric network analysis and Spatial Analysis results will be presented to illustrate the complexity and multiplexity of peer recruitment dynamics among IDUs during RDS implementation. Types of data and opportunities for Statisticians to build better inference models in the future will also be discussed.

Multidisciplinary Perspectives on RDS Inference SAT.PM1

Real World Respondent Driven Sampling: Are Risks Above the Ethical Limit?

Heather Mosher, Institute for Community Research, Gayatri Moorthi, JiangHong Li, Margaret Weeks

Contact: heather.mosher@icrweb.org

Background: Researchers know little about the reality of what happens during peer recruitment. Scott's ethnographic study on respondent driven sampling (RDS) suggests that recruiters use

peer influence in ways that may be experienced as coercive to peers. Purpose: To explore the range of methods used by participants to recruit peers, and the extent to which peers' approach to recruitment may introduce risks above the ethical limit. Methods: Out of 500 injection drug users who participated in a mixed-method RDS methodology evaluation study, 60 participants completed an in-depth semi-structured interview at a 2-month follow-up to explore their experiences with the recruitment process. The last 32 participants also completed a brief ethics survey on their experience of recruitment. Results: Findings revealed that participants used a variety of methods to recruit peers, ranging from one-time interactions to more active methods to encourage participation. Examples of more active strategies include: selecting peers that can be easily found and contacted later, offering peers the use of their cell phones to schedule appointments, asking peers to return the study coupon to them if they do not use it, following up with peers to remind them of their appointment, and accompanying peers to the study site. Some participants described these active methods as helpful in reducing barriers to participation, while a few expressed feeling pressured. However, the interviews did not reveal that participants felt coerced by peers. Discussion: Results raise questions about the extent to which recruitment pressures are beyond expected relationship reciprocity.

Multidisciplinary Perspectives on RDS Inference SAT.PM1

Respondent-driven sampling on random graphs: analytic results for network inference

Forrest Crawford, Yale School of Public Health, Aleksandr Sirotkin, Robert Heimer

Contact: forrest.crawford@yale.edu

Respondent-driven sampling (RDS) is network-based method for sampling members of a hidden population through the social ties of recruited individuals. While RDS is a powerful way of obtaining data on stigmatized or marginalized populations, estimation of population quantities and social network characteristics from RDS data is controversial. Because the social network structure of hidden populations is often of intrinsic value, there is great interest in using RDS data to infer properties of the underlying social network on which the sampling process takes place. Most previous attempts have focused on trying to correct for possible ascertainment bias by determining sampling probabilities for recruited individuals. This approach to ameliorating this kind of bias is difficult because much of the network information is missing in RDS samples: social ties between individuals who did not recruit one another remain unobserved. In this presentation, we examine under what circumstances it is possible to infer properties of the population social network from RDS samples. Our approach uses the theory of random graphs and random walks on graphs to derive results that illuminate characteristics of real-world RDS samples and provide insight into the respondent-driven recruitment process on the underlying social network. Using probabilistic graph models, we determine sampling probabilities and provide an interpretation of RDS as a continuous-time non-self-intersecting Markov random walk on a graph. These results yield a likelihood-based

inference method for estimating network properties. We apply our methods to RDS data from a population of intravenous drug users in Russia.

Networks and Teams SAT.PM1

Networks and Teams SAT.PM1

Application of Social Network Analysis to FIFA 2010 World Cup Soccer Games: Quantification of the Difference between the Dominant Team and the Outplayed Team

Keita SUGIHARA, NANZAN UNIVERSITY

Contact: sugihara@nanzan-u.ac.jp

In a soccer game, players pass a ball between one another for scoring a goal. By entering the number of times player i passes the ball to player j into the (i, j) element of an adjacency matrix, we can analyze the game using Social Network Analysis (SNA). The research question in this presentation is how the difference between a dominant team and an outplayed team can be quantified using SNA. As an example of games with difference in ball possession rates, the author cites games from the FIFA 2010 World Cup. At the second stage, the largest difference in the ball possession rate was observed in two games. The games were: Spain versus Portugal (Round of 16) where the ball possession rates were 60% and 40% respectively, and Paraguay versus Spain (Quarter-finals), where the respective rates were 40% and 60%. Spain won both the games and was also the World Cup winner. The author applies structural equivalence analysis, block modeling, and centrality analysis to the two games. By using structural equivalence analysis and block modeling, he indicates that Spain's players were better at passing the ball to each other when compared with the players of the Portugal and Paraguay teams. In centrality analysis, the author suggests that players in the Spain team with high centrality scores did not stay on one side in the team, while in the Portugal and Paraguay teams the players with high centrality scores tended to stay on one side of the team.

Networks and Teams SAT.PM1

Assembly factors influencing the victor in head to head competitions among small teams over medium duration in tennis doubles

Alexandros Nathan, <p>Northwestern University</p>, Biswanath Banik, Noshir Contractor

Contact: AlexandrosNathan2012@u.northwestern.edu

Team optimization is a main issue of concern for organizations across various industries. In this project, we explore the factors that lead to the formation of successful teams. More specifically, we employ a variety of techniques in social network analysis to study the emergence of successful teams in men's tennis doubles, with an emphasis on data coming from Grand Slam

tournaments. The focus of this research is both on individual player attributes (e.g. are left handed players more likely to be a part of a successful team?) as well as team features (e.g. do teams composed of players from the same country of origin tend to be more successful?). Finally, we look into the general collaborative patterns of players, which we identify through social network structures and explore whether players who are only involved in triangular structures are less likely to have participated in a successful team.

Networks and Teams SAT.PM1

Assembly factors influencing the victor in head to head contests between teams of larger size and over longer duration playing cricket

Satyam Mukherjee, Northwestern University, Brian Uzzi, Noshir Contractor

Contact: s-mukherjee@kellogg.northwestern.edu

The debate about the impact of new team configurations on outcome of a contest have attracted sports enthusiast and sports scientist for years. Over the years, sports fanatics have made a lot of assumptions. However this anecdotal evidence cannot be taken as scientific fact. In this paper, we use the data of teams playing in the Indian Premier League (IPL) between 2008 and 2012, as well as data for the more localized T20 matches going back to 2006. These earlier interactions are examined and mapped to study how individual talent, historical intra-team relationships, and historical inter-team relationships describe and predict Cricket match outcomes. In this paper, we quantify the advantage given to an IPL team (or any other T20 team) with "advanced information" of its opponent. We investigate the hypothesis whether being on the same team as someone else provides an insight into their habits, techniques, ability and athletic talent in a unique way. We also study the situation where team members of opponent teams, have played with each other in the past. Having this "prior knowledge" gives insight that one would not be facing a team of total strangers. Our results indicate that relation between team members of the same team as well as the opponent team has a significant effect on the outcome of a Cricket match in the T20 format. Our results can be extended to other forms of sports – for example the English Premier League.

Networks and Teams SAT.PM1

Assembly factors influencing the victor in head to head short duration team competitions in a multiplayer online battle arena game

Julia Neidhardt, Vienna University of Technology, Yun Huang, Noshir Contractor, Biswanath Banik

Contact: julia.neidhardt@ec.tuwien.ac.at

While network approaches are used to study how the assembly of teams impacts their performance, there has been little attention to assess the impact of assembly on the relative performance of two teams in a head to head contest. In this study, we focus specifically on assembly factors that influence performance of short-duration contests in mid-sized teams playing a multiplayer online game, Dota2, where two teams consisting of five players each compete with each other. We determine the attributes and relational factors that help a team to defeat the opponent. Among attributes we consider the players' skills as well as the diversity of their skills and their roles. Relational factors include the friendship relations within a team, previous co-playing experiences of team members as well as the embeddedness of the team, i.e., whether team members belong to a community that often plays together. We use game log data for short matches (under 30 minutes) within Dota2 to empirically test this model. We find that teams with players who have more diverse roles are more likely to win. We also find some evidence that teams consisting of players who have focused on training their fighting skills rather than on non-fighting skills have an advantage. However, when relational factors are included in the model, some skill factors are no longer significant. Instead, friendship ties between team members as well as the embeddedness of the team within the community have a positive impact on the likelihood of a team to win.

Networks and Teams SAT.PM1

Compositional, relational and ecosystem influences on team assembly in emerging scientific fields

Alina Lungeanu, Northwestern University, Sophia Sullivan, Noshir Contractor

Contact: alina.lungeanu@u.northwestern.edu

Explaining the assembly of scientific teams, which are oftentimes at the root of innovative breakthroughs, has recently attracted scholarly interest. A first step in this direction has been an examination of the compositional and relational mechanisms at play when scientific teams form. While this research has increased our understanding of scientific team assembly, it overlooked the reality that individuals are part of larger ecosystems of scientific teams. Such

ecosystems contain interlocking relationships among teams with common members. These interlocks help to generate knowledge and learning, and may directly affect how teams are assembled. To address this oversight, we propose an all-inclusive framework that examines the mechanisms of scientific team assembly from the compositional, relational and ecosystem perspectives simultaneously. To achieve this goal, we develop a hybrid agent-based and system dynamics computational model that incorporates individual and system-level influences on team assembly. We choose an empirical setting that allows us to empirically assess the magnitude of the various mechanisms we propose. Specifically, we examine scientific teams in the Oncofertility scientific field from its inception (1993) until 2010. The emergence and evolution of a new scientific field represents an appropriate context to examine assembly of scientific teams since (1) scientific teams are often assembled on an ad-hoc basis reflecting the autonomous and individual choices of its team members and (2) the evolution of the field allows us to explore how individuals change their behavior when choosing their collaborators as the field grows and how the field as a whole influences individuals behavior.

Politics and Networks Structures SAT.PM1

Politics and Networks Structures SAT.PM1

The Formal Structures of American Families

G. Gauthier, Duke University

Contact: grg5@soc.duke.edu

Social scientists and the public alike are grappling with the problem of how to define family and kinship. Over the last 40 years there have been fundamental changes to family structure in the U.S. and a proliferation of diverse family forms (Scanzoni, 2001). Despite recognizing the magnitude of these changes, most continue to limit the study of families to groups of people related by blood or marriage, typically living in the same household (Stewart, 2007; Ganong and Coleman, 2004). I argue that families are constituted by the time spent, and activities done, with others rather than and consanguinity co-residence. Using data from the 2011 American Time Use Study, and the Child Development Supplement of the 2011 Panel Study of Income Dynamics, I offer an innovative solution to uncover the multiple logics of current family organization, applying clustering techniques to bipartite networks constructed from time use data. I apply these findings to current debates about families in the United States.

Politics and Networks Structures SAT.PM1

Influence in the United States Senate

Matthew Denny, <p>University of Massachusetts Amherst</p>

Contact: mdenny@polsci.umass.edu

The United States Congress is an institution designed with the aspiration of allowing elected representatives to introduce legislation that reflects the preferences of their constituents. Yet a key factor mediating a legislator's ability to represent their constituents and political convictions is their ability to influence other legislators to support their agenda. Influence is an inherently relational process that cannot be understood or accurately measured by looking at dyadic relationships out of their larger context. Previous studies have primarily used successful floor amendments as a measure of legislative influence, while more recent work has used "connectedness" in the congressional bill cosponsorship network as an alternative measure. I dive below the surface of observed interactions and use bill cosponsorship data as an instrument to infer a latent network of influence relationships between legislators in the U.S. Senate. I then derive a legislative "dominance" measure from the inferred latent influence

network. This measure of influence is more deeply grounded in a relational theory of influence than previous measures, and provides a sound theoretical foundation for the formulation of expectations about its operation. I compare legislative dominance against previously proposed measures of legislative influence in predicting bill passage in the Senate between 1981 and 2004 and find that it significantly outperforms them in predicting bill passage.

Politics and Networks Structures SAT.PM1

How Homophily and Heterophily Interact: Political Talk as Groundwork for a Multilevel System

Tunde Cserpes, University of Illinois at Chicago

Contact: tcserp2@uic.edu

Everyday political conversations take place behind closed doors where people talk with their confidants, far from the so-called public spaces. By ‘stretching out’ the social and taking relationships as the main unit of analysis, I show how such relationships can actually furnish the groundwork for broader institutions, like the political system. I decompose dimensions of homophily, and assess whether certain individual similarities facilitate or hold back informal political talk while accounting for network-level characteristics as well. I use the Chicago Area Study “important matters” name generator from 2010 to execute the research. My approach applies relational sociological theory to hierarchical linear modeling. The results suggest that individuals are active contributors to the system of politics through their everyday conversations: they are doing deliberation in personal relations as well as in workplaces. Moreover, it is the relational characteristics that affect the emergence of political talk; the similarities and differences between people in a social relationship are what matter, not their individual attributes per se. Through the analysis of interaction effects, I show that political talk is more likely to emerge when spatial heterogeneity has a homophily base and when a relationship connecting individuals of different citizenship status has a homogeneous network base. This research broadens the way we must think of the public sphere, calls for theorizing about homophily and heterophily as multilevel concepts, and shifts the focus on how they interact.

Politics and Networks Structures SAT.PM1

Japanese first "Internet Election" and SNS use impact on political participation

Ken'ichi Ikeda, Doshisha University

Contact: keikedata@mail.doshisha.ac.jp

After the removal of ban on Internet use in the election campaign in Japan, the House of Councilors Election in July 2013 revealed that the campaign use of Internet was effective in mobilizing voters for political participation with interactively facilitative role of SNS use. The survey data we focus here is from Japanese respondents who were screened by using twitter, accessing political information via Internet, and accessibility of his/her twitter account name in order to make correspondence between survey responses and his/her tweets. The final N was 1030. The results showed; 1. Online mobilizing communication from political parties/candidates was as half as that of offline, but widely spread. The same was true for that from friends/acquaintances. 2. Web sites much accessed for political party/candidate information were divided into neutral news sites and twitter comments. Direct access to candidates' or political parties' own sites were much less. 3. However, following candidates/political parties/other politicians via SNS were well practiced, i.e. partisan information was affluent for many voters, and actually facilitated political participation. 4. In their SNS use, most of the respondents witnessed that their friends comments/retweets politics and elections. 5. Multivariate analyses revealed; - Online mobilization from parties/candidates was effective for voters to participate in consistent with mobilizing political color. - The tendency by the respondents to discuss politics/elections was much facilitated by having politically active SNS friends. 6. The next step will be to explore what kind of twitter comments are related with his/her political/social characteristics.

Politics and Networks Structures SAT.PM1

Social Isolation and Influence in Political Communication Networks

Jack Reilly, New College of Florida

Contact: jreilly@ncf.edu

This paper uses a networked group experiment to examine the role of social isolation relative to the flow of political information within political communication networks. Using a DeGroot model, I predict the convergence properties of experimental networks and examine the roles that socially isolated individuals play in reaching equilibrium. In particular, I discuss three things: individuals who play the role of "prime movers" in a network, the effect that isolated individuals have on the model's speed to convergence, and the ultimate traceable influence

social isolates have over the kind of equilibrium the model reaches. I argue that while it is often difficult to distinguish the impact that social isolates have on the beliefs of individuals at equilibrium, isolates can play a critical role in either allowing networks to diffuse information quickly or in preventing networks from efficiently transmitting information.

Qualitative Social Networks Research SAT.PM1

Qualitative Social Networks Research SAT.PM1

Exploring the Network Heterogeneity of Low-Income African- and Latin-American Women

Silvia Dominguez, <p>Northeastern University</p><p>Department of Sociology</p>, Tennille Allen

Contact: s.dominguez@neu.edu

Structurally developed segregation and individually produced homophily maintain communities homogenous with individuals who are alike. This is particularly a problem in concentrated areas of poverty because information gets recycled and there is no exposure to diverse ways to deal with problems and opportunities. Two questions drive this study: First, where does the network heterogeneity of Latin-American and African-American women in public housing stem from? Second, what resources are made available to these low-income women through their heterogeneous networks? We explore these questions using data collected over two years through ethnographic interviews and participant observation with African-American and Latin-American women living in areas of concentrated poverty in neighborhoods in Boston and Chicago. We find that the women in that sample have access to support and leverage through heterogeneous ties but that while the Latin-American women had both class and racial heterogeneity, the African-American women had class based heterogeneity only.

Qualitative Social Networks Research SAT.PM1

Network Design

Nancy Roberts, Naval Postgraduate School School of Operational and Information Sciences
Department of Defense Analysis

Contact: nroberts@nps.edu

This paper identifies challenges in applying social network theory to public sector practice: how to define the social network of interest; how to bound the social network; how to describe the relationships that create the social network; how characterize the social network's elements such as its structure, governance, and culture; and how to chart the evolution of a social network over time. The paper then introduces the concept of network design to address these challenges. Network design is the configuration of a network's elements that form a coherent whole. Configurations can and do vary and to date four dimensions have been identified to

describe these variations: the degree of network unboundedness-boundedness; the degree of informality-formality; the degree of heterarchy-hierarchy; and the degree of shared-centralized governance. When combined, these four dimensions produce two “ideal types” that anchor the opposite ends of the network design continuum: Social Networks as Anarchy and Social Networks as Bureaucracy. The explorations of social networks through a design lens has important implications for practitioners who create, develop, and redesign networks and analysts who document the conditions under which social networks emerge and evolve over time.

Qualitative Social Networks Research SAT.PM1

Social Networks of Converts to Islam

Sakin Erin, University of Kentucky Department of Sociology

Contact: sakinerinl@gmail.com

Islam is the fastest growing religion in the United States. In the context of Islamaphobia and the perception of Islam as the religion of the “other” it is controversial that Americans convert to Islam. Although there is growth in the population of Muslims in America, there is also reversion from Islam. Using a case study this research investigates (a) if people are more likely to convert to Islam if they have ties to other Muslims in their social networks; and (b) if converts be more likely to revert to their prior beliefs when they lose social capital and emotional support provided by their social ties prior to their conversion. Although Islam strongly emphasizes group unity and solidarity, it is surprising that conversion to Islam does not yield similar results for all groups. I find that conversion to Islam increases in-group coherence for the minorities, while it brings about fragmentation for the majority group. By investigating prior and post conversion social networks of converts to Islam, I investigate why African American converts tend to drop their prior to conversion social ties, reduce their post-conversion networks to only their family members, while Caucasians lose social ties to family members and close friends.

Qualitative Social Networks Research SAT.PM1

Toward a Validity Framework for SNA in the Social Sciences

Chase Nordengren, University of Washington College of Education

Contact: chasen@uw.edu

While social network researchers are increasingly participants in the discourse about social science methodology, a rigorous framework for the validity of social network research has not

been established which parallels that in the quantitative or mixed methods literature. While quantitative network researchers can rely, in part, on the quantitative validity literature, they also face concerns specific to their work, including the reluctance of some subjects to describe personal relationships, the relative instability of networks (Carpentier & Ducharme, 2007), separating and characterizing types of dyadic links between individuals (Howinson et al., 2011), and the relationship between specific network questions and their underlying constructs (O'Reilly, 1988). This paper draws on quantitative and mixed methods validity frameworks, particularly those in the educational sciences (Onwuegbuzie & Johnson 2006; Johnson & Onwuegbuzie 2013) to propose some criteria for assessing the validity of social network research and network visualization in the social sciences. Threats to internal validity, particularly construct and content validities, are emphasized and the distinction between "validity" in quantitative research, "credibility" in qualitative research and "legitimation" in mixed methods research is explored.

Semantic Network Analysis SAT.PM1

Semantic Network Analysis SAT.PM1

Combining network structures and meanings: Tweeting over IPCC report

Iina Hellsten, VU University Amsterdam Dept. of Organization Sciences, Kim Holmberg

Contact: i.r.hellsten@vu.nl

Twitter messages provide a rich data set for combining social and semantic network analysis. The meanings communicated in Twitter can be connected to the individual or collective actors, and the spread of specific meanings can be traced over time and across different Twitter communities. In this paper, we present first results of connecting social and semantic Twitter networks related to the latest IPCC (Intergovernmental Panel on Climate Change) report that was published in 27 September, 2013. Our data set covers Tweets mentioning “IPCC” over a period of two weeks (September 17-October 8, 2013). Within the time period a total of 152,893 tweets were collected. We use a combination of webometrics methods and social network analysis to detect communities of climate skeptical and climate convinced tweeters and compare the content of the tweets from these different communities. Overall, tweeters were most likely to converse with others holding similar views. However, two communities displayed significant links between climate convinced and critical tweeters, suggesting that those engaged in the climate debate were exposed to views contrasting with their own. These views, and how they differ and overlap between the different communities, are our focus. Our aim is to extend upon network research that combines the structure and the content in networks by focusing on the structure of tweeter communities (agents) and the content of their tweets (meanings) over a period of two weeks. By doing so we will present a novel approach to analyzing content of tweets.

Semantic Network Analysis SAT.PM1

Identification of Social Roles Using News and Twitter

Kathleen Carley, Professor Computations, Organizations and Society, Carnegie Mellon University

Contact: kathleen.carley@cs.cmu.edu

Social roles can be thought of as the social presentation of self through interaction and cultural positioning. In other words, a role is determined by both whom ego appears to interact with and what ego appears to espouse. Individuals can play different roles in different contexts and

across time by varying structure of their interactions and discussions. To assess these roles, a meta-network consisting of three types of nodes (people, organizations, and topics) and relations within and among these nodes (including but not limited to the social and knowledge networks) are extracted using advanced text-mining techniques from Twitter and news data. Then roles are extracted using one and two-mode network metrics. One mode metrics used include degree centrality and betweenness. Two mode metrics used include redundancy and exclusivity. Based on both social theory and the rhetorical theory of reach a set of patterns of metrics for common roles such as consensus builder, cheerleader, opinion leader, are defined. The identified socio-political elite for various countries including Myanmar and Kenya are then classified into roles using these metrics. The results show that roles and changes in roles can be identified, and that individuals shift roles in times of crisis. We also find that it is possible, those less systematic, to identify thematic roles such as “improve the economy” or “save children” using this data. In general, high-dimensional network metrics enable a systematic, and rapid, approach to role assessment.

Semantic Network Analysis SAT.PM1

News Framing in an International Context: A Semantic Network Analysis

ke jiang, University of California, Davis, George Barnett

Contact: kejiang@ucdavis.edu

This paper is a comparative study examining the effects of macro-societal structures on news framing and frame dynamics in an international context. By conducting a semantic network analysis, it investigates how national political cultures shape news frames of international political coverage, and finds that cultural characteristics of frames used by news agencies covering international political news are relatively stable over time. Specifically, when reporting on Arab Spring, The New York Times paid more attention to democracy, which is a core value of American political culture, whereas Xinhua News Agency paid more attention to authority, which is the central concern of Chinese political culture. The centrality of “democracy” in The New York Times and the centrality of “authorities” in Xinhua News Agency were relatively stable in 2011.

Semantic Network Analysis SAT.PM1

Content and Bibliometric Analysis of Tobacco Regulatory Science Research: Exploring a Developing Research Field

Janet Okamoto, Mayo Clinic, Scott Leischow, Hongfang Liu, Dingcheng Li

Contact: okamoto.janet@mayo.edu

In 2009, the U.S. Food and Drug Administration (FDA) gained regulatory authority over tobacco. This authority has the potential to achieve what many in tobacco control have sought to achieve for decades: the virtual elimination of tobacco-caused morbidity and mortality for future generations of Americans. Although a sound science base exists with regard to numerous areas of tobacco control, new research is needed to provide scientific evidence to inform tobacco products regulation. Therefore, the FDA's new authority has resulted in a large expansion of research activity across many disciplines to gain the information necessary to make regulatory decisions in the best interest of the public's health. We conducted bibliometric analyses of publication data in the domain of tobacco regulatory science (TRS). Publications were pulled from currently funded TRS investigators to examine author-topic modelling and co-authorship networks, as well as by keyword terms pulled from TRS priority areas identified by the FDA to look at how concepts are linked, temporal trends in TRS research, and to begin identifying the boundaries of TRS research. In order to assess the breadth and scope of TRS research funded by the FDA we also conducted content analysis of funded TRS grants and projects. We used automated, natural-language processing software and semantic network methods to extract data from grant descriptions and keywords. We will present information about shared or common research areas across grants and projects, identify unique contributions of certain grants, and detect content 'holes' in the research based on previously identified research priority areas.

Comparing Climate Change Policy Networks SAT.PM2

Comparing Climate Change Policy Networks SAT.PM2

The power of oppositional climate change information from a network perspective

Derric Jacobs, Oregon State University University of Alberta, Edmonton

Contact: jacobsd@onid.orst.edu

Climate change is one of the world's most "wicked" problems. Recent evaluations of climate science have demonstrated strengthened confidence and consensus about anthropogenic climate change. Yet we continue to fail to mitigate these anthropogenic contributions, making adaptations to new socio-ecological systems a must. Community-based adaption is of specific interest to adaptation scholars, as it allows for specific social, cultural, physical and economic risks and vulnerabilities to be addressed. Many communities lack the understanding to assess the specific risks and vulnerabilities that they face within such a complex problem. They remain dependent on the diverse information sources available through various media that present both supportive and oppositional perspectives on climate change. Research conducted in two rural communities explored diverse information sources about climate change, and investigated how diverse sources influence people's positions on climate change. A roster with tie strength measures was used in a mailed questionnaire. The data was analyzed as a two-mode network and examines the correlations between information sources and resident's positions on climate change and its local impact risks. The analysis indicates that there may be stronger correlations between resident's views and opposition information sources; there is a difference between tie strengths in the correlations to climate change and local risk positions. For perspectives about climate change, stronger identified ties are influential, although weaker ties are correlated with local concerns on climate change impacts. This may present a problem for community-based mobilization toward adaptation through confusion of the facts that lead to decreased concerns.

Friendship networks SAT.PM2

Friendship networks SAT.PM2

Cliques and ego-networks in disentangling peer effects

Valeria Ivaniushina, Higher School of Economics, St.Petersburg, Russia, Daniel Alexandrov

Contact: v.ivaniushina@gmail.com

Our paper is concerned with different definitions of peer groups and their effects on academic performance. "Peer group" can be defined in many ways: all students in a school, grade cohort, students in the course, roommates in dorm, crowds, friends etc. All these definitions are valid because school social life of teenagers is multiplex. We use the data from our representative survey of 98 schools which provides us with 270 complete class-based networks (N students = 5300). Students were allowed to nominate up to 10 friends in the class. Using Kliqefinder software (Frank, 1995, 1996) we identified tight social group (cliques) within complete class networks. Two definitions are employed: (1) peers as co-members of the same clique; (2) peers as friends nominated by the student, i.e. ego-networks. We examine association between student's GPA and her friends' school-related attitudes, controlling for student's own attitudes and socio-demographic characteristics. We used multilevel technique suited to the structure of the data. Students are nested within schools, classes, cliques and egonetworks. Cliques are non-overlapping entities while ego-networks are overlapping, hence we used "cross-classified" multilevel models. The models were estimated with the MCMC procedure using MLwiN. The results show that both groups of friends' attitudes are associated with individual student's academic success, but for "real friends" the association is stronger. Additionally, school effect on GPA disappears when friend's attitudes are taken into account. In the presentation we will discuss both our results and conceptual implications of different definitions of peers.

Friendship networks SAT.PM2

Friends Wearing Feathers Work Together: A Social Network Analysis of Show Club Coworkers

April Gunsallus, The Pennsylvania State University

Contact: alg978@psu.edu

One of the pleasures of a labor job is the companionship of the work crew. In fact, this companionship may be especially important to workers in the most socially marginal jobs. This case study examines the occupational culture of an exotic dance club, where workers report friendship as an important reason they stay on the job despite its hardships. While social

network analysts have explored many white-collar work settings, blue-collar worksites receive less attention. Furthermore, strip club cultures are particularly difficult to study quantitatively because they employ a mostly anonymous, highly nomadic workforce. Facilitated by my prior ethnographic study of the same site, I have unique access to a strip club crewed by a relatively stable work population. For this paper, I have collected both structural and compositional data on a complete network of 24 women and men (18 dancers, 6 staff members) whose mean job tenure is 3.48 years (s.d.=0.13). I investigate the sentiment relations among them using valued data on six multiplex relations: on-the-job friendship, fun, intimacy, generosity, trust, and off-the-job frequency of interaction. Does shared organizational club structure influence coworker bonding more so than workers' homophilistic attributes? Do off-the-job interactions heavily account for on-the-job friendships? How much does tenure matter for the overall social experience at the club? These results will extend existing research on job commitment and satisfaction by emphasizing that the interpersonal relational context in which labor is performed has the potential to provide meaning and pleasure in a sometimes chaotic, difficult job.

Friendship networks SAT.PM2

How Setting Constrains Friendship: An Affect Control Analysis

Dawn Robinson, University of Georgia
, Lynn Smith-Lovin, Long Doan, Christopher Moore

Contact: sodawn@uga.edu

This paper uses affect control theory based simulations to explore the theoretical relationship between social settings, social identity, and the structure of social relationships. We examine the goodness, power, and activity in eight hypothetical friendship structures premised on the assumption that individuals become friends in order to increase opportunities for enacting valued identities. Affect control theory offers a mathematical model of how settings constrain affective responses to routine and non-routine social events. We present simulations of identities spread evenly across three dimensions of cultural meanings (evaluation, potency, and activity) interacting with one another in the context of eight social settings that are also spread out in the same three dimensional semantic space. These simulations predict the likelihood of a friendship tie occurring within these identity by identity by setting pairings. We analyze the resulting 27 (identity) x 27 (identity) x 8 (setting) social network using conventional clustering and blockmodeling techniques and using exponential random graph models. ERG models reveal how the meanings of the social setting alter the relationship between identity meanings and friendship structures. We conclude by relating the findings of our theoretical analyses to known empirical patterns and by offering some novel hypotheses to be tested with future data.

Friendship networks SAT.PM2

What do we mean by friends in the world ? An inductive study

Ainhoa de Federico, CERS-LISST University of Toulouse, France, Livia García Faroldi

Contact: ainhoa.defederico@univ-tlse2.fr

Based on secondary analysis from two internationally based surveys on personal networks and social support (ISSP 2001 and BBVA 2005) this presentation explores similarities and differences of the meaning and practices implied in friendship relations in different countries in the world. While a certain number of general trends regarding sociodemographic characteristics of egos across countries can be found, the expectations and practices in friendship relations show some interesting differences. Differences in understanding of friendship can be related to macro social variables such as State's Social Regime. How solidarity, exchange and roles are understood and organized at the macro societal level impact interactions at the micro individual level.

Networks and Trust SAT.PM2

Networks and trust SAT.PM2

#BanksyInBoston or #BotsInCopenhagen?

Piotr Sapiezynski, Technical University of Denmark, Sune Lehmann

Contact: pisa@dtu.dk

Abstract Is it possible for a small computer science course to exert measurable influence (trending topics) on Twitter, a massive social network with hundreds of millions of users? In this article, we show how we achieved this using simple Python scripts and the Twitter API to build a team of social bots. We reveal the heuristics used to create their Twitter profiles, gain followers, and successfully spread mis-information that reached and influenced real social systems as well as Twitter-analytics companies. Summary In a few weeks we built a small network of Twitter socialbots with substantially more impact than a single individual with a similar number of followers. The bots successfully gained followers among target population of people living in Boston, MA, in an automated fashion to then spur a discussion involving Bostonians and the media around a hoax. By revealing our methods of circumventing Twitter's spam-bot detection algorithms, we point out that it is relatively easy to build a much larger system of coordinated bots that – in terms of advertisement – could be used to gently boost interest in, for example, an upcoming movie. Or – with malevolent intent – could use a network of "sleeper bots" to systematically spread mis-information, e.g. injecting talking points into Twitter streams on a global scale. We hope that this little experiment can be helpful in creating awareness of such subtle manipulations before they begin shaping our public conversations.

Networks and trust SAT.PM2

Network Dynamics and Generalized Trust in a Japanese University Student Class

Hideki Fujiyama, Dokkyo University

Contact: fujiyama@dokkyo.ac.jp

This paper examines evolution of conversation and advice networks in a Japanese University class. Data were collected between April 2013 and July 2013. The class comprised 34 sophomore and junior students, who were the participants of this study. Network data are assessed at three points in time at about two-month intervals. Our analysis focused on two different networks, namely the "Study Conversation Network," in which data were collected by asking students to indicate those classmates with whom they most frequently engaged in conversation

about their studies, and the "Study Advice Network," in which students were asked to indicate classmates whose advice they would seek with regard to studies if needed. The average number of nominated classmates was about five over three waves. Jaccard indexes are between 0.37 and 0.54. A feature of this analysis is that generalized trust is included as a covariate. In the estimation using RSiena (ver. 1.1-243), network structural effects (such as out-degree, reciprocity, and balance) and other covariates (gender similarity and grade similarity) are statistically significant. In addition, similarity of generalized trust is positive and significant. However, neither the level of generalized trust for "alter" nor for "ego" is significant. These facts support the interpretation of generalized trust as individual characteristics such as optimism, but do not support the role of generalized trust as decreasing communication cost with others.

Networks and trust SAT.PM2

Price Discrimination and Social Networks – Use of Social Networks as a Tool for Mitigating Asymmetric Information Problems

Károly Miklós Kiss, <p>Centre for Economic and Regional Studies of the Hungarian Academy of Sciences</p><p>and</p><p>University of Pannonia</p>, Zsolt Stenger

Contact: kiss.karoly.miklos@krtk.mta.hu

One of the most relevant and exciting issues in the latest decades in economics had been the asymmetric information and uncertainty, and their effects on market processes. Some studies show that markets where information problems or/and uncertainty arise tend to be "networked", and some studies propose that use of social networks can mitigate adverse selection and moral hazard problems, but this area is still under-developed. Price discrimination is a representative situation where asymmetric information vigorously appear. Firms rarely have precise information about the types of individual customers (their preferences or willingness-to-pay), but can use incentive tools and screening mechanisms. Use of signaling and screening can reduce the cost of incentive under asymmetric information. We develop a model to show that social embeddedness of buyers and some relevant features of their social network can be used for signaling and screening to mitigate the information problem in pricing decisions. Although our model refers explicitly to the case of price discrimination but the conclusions we draw can be generalized and can be applied to other situation where asymmetric information appears and social network has important role such as labor markets, micro-finance groups, online peer-to-peer lending and other online peer-to-peer markets.

Networks of Leadership and Social Change in Post-Apartheid South Africa SAT.PM2

Networks of Leadership and Social Change in Post-Apartheid South Africa SAT.PM2

A phenomenographic analysis of leadership and social change

Dave Bell, Clark University

Contact: dbell@clarku.edu

This research explores the relationship between leadership development, social engagement and action or agency of students, as a means of understanding the relationship between evolving social networks and individual and collective social action or student leadership. Using the theoretical frameworks of transformational leadership of Burns and Avolio, this research attempts to graph the range of leadership trends and modes that have emerged among student leaders. Data was collected through electronic surveys, interviews and leadership data trends among students in leadership positions. The phenomenographic findings are then analysed using the associated social network data for each cohort. The analysis is instructive of the complex inter-relationships of race, gender, ethnicity, language and social relationships and evolving social networks between and among the various cohorts of student leaders at UFS. This research contributes to the evolving body of literature and theory that is attempting to understand the nexus of transformational leadership and social networks.

Networks of Leadership and Social Change in Post-Apartheid South Africa SAT.PM2

Transforming racialized legacies through student leadership networks

Marianne Sarkis, Clark University, Dani Battle, Imran Chowdhury

Contact: msarkis@clarku.edu

Despite a national constitution and policies of racial integration, especially in national higher education institutions, apartheid ideologies continue to impact social relationships among students. The presentations constituting this panel emerge from an on-going four-year multi institutional research project at the University of the Free State in South Africa. In 2009 UFS launched a Leadership for Change (LFC) program comprising of short immersion programs abroad into US institutions that model progressive social justice programming and facilitate the exchange of progressive ideas. Our research aimed to examine the changes in the formation and structure of social networks and social capital among and between diverse cohorts of student

leaders, on student leadership development, and on student conceptions of social change. We examined how racial attitudes and friendship networks change and influence the ability to achieve leadership positions in a diverse network of cohorts of UFS. Social network surveys were complemented by in-depth interviews, focus groups, and content analysis of journals and reflections. We assessed the level of racial social integration and network density pre- and post-immersion programs as well as examine the relationship between leadership, social capital, and race, specifically with regards to feelings of trust, friendships, and romantic involvement. The analysis contributes to the body of literature and theory that is emerging in relation to social capital formation and changes in networks resulting from study abroad and immersion programs. It also highlights some of the uncertainties that post-apartheid students experience after they are immersed in diverse international environments.

Networks of Leadership and Social Change in Post-Apartheid South Africa SAT.PM2

Exploring students phenomenological conceptions of social change

Beverly Bell, Mt. Holyoke College

Contact: bjmbell@gmail.com

Using a conceptual framework that integrates Padilla's social cognition and social identity theory with self efficacy theory, this research explores evolutions and changes in student leaders' conceptions of social change. This research uses a phenomenological mode of data collection and analysis to understand the relationships and impacts of the evolving social networks and social capital formation among cohorts. Data were collected through social networking surveys and in depth interviews that addressed conceptions of social change, trust, friendship, and relationships between and within cohorts. The data was also viewed through the analytical lenses of race, class, gender and identity. The analysis reflects the formative learning from the first year of program implementation and contributes to the body of literature and theory that is emerging in relation to social capital formation and changes in networks resulting from study abroad and immersion programs and highlights critical elements necessary in further theorizing about study-abroad and student leadership development.

Online Networks SAT.PM2

Online Networks SAT.PM2

Behavioral Responses to Fact-Checking Interventions in Online Social Networks

Aniko Hannak, Northeastern University, Brian Keegan, Drew Margolin, Ignmar Weber

Contact: ancsaaa@ccs.neu.edu

Online social networks are used extensively to discuss current events, to disseminate new information, and to mobilize action. Unsurprisingly, these platforms are also used to spread misinformation about political candidates, policies, and other topics. This has in turn given rise to a variety of “fact checking” initiatives such as Snopes.com and non-partisan political information sites like FactCheck.org intended to debunk lies, distortions, and other misinformation in popular and political culture. These sites are then used as rhetorical resources in social media conversations, where individuals can link to these fact checking pages to challenge or bolster the points made by others. In this paper we examine the prevalence, effectiveness, and structural context of this user-to-user fact-checking behavior within Twitter. First, we analyze the general prevalence of this behavior by identifying tweets containing links to popular fact-checking websites. We then draw a random sample of these fact-check conversations for further analysis. Human coders evaluated several content-level features to reveal what portion are challenges, echoes of support, or other uses of fact checking. Next we analyze the effectiveness of the fact checking as a strategy for challenge by examining whether the target of the fact check subsequently changes his or her behavior. We examine whether the target of the fact check subsequently changes communication behaviors by tweeting less, shifting topics, or changing sentiment relative to their behavior prior to the fact-check. Finally, we analyze the role of social networks as a moderator of both fact checking the behavioral response to it. Using both declared follower ties as well as informal retweet and reply ties, we test whether fact checking behavior tends to occur along users with strong reciprocated formal ties, negative informal ties, or non-existent ties. The findings of this research have implications for understanding how to design mixed methods research on large-scale behavioral data, developing theories about interpersonal political communication over online social networks, and empirically measuring the effectiveness of fact-checking initiatives in halting the spread of misinformation.

Online Networks SAT.PM2

Honey-pot profiles and malevolent e-reputation attacks on Facebook

Nasri Messara, <p>Université de Montpellier I (France)</p><p>Université Saint-Joseph (Lebanon)</p>, Anne Mione

Contact: nasri@messararra.com

When Heiderich defined the Internet as “a magma of will of influence” (Heiderich, 2009), he raised an essential question regarding the influence problem over the Internet : Will the firms understand, embrace and act on innovation and novelty or turn into a ball of spikes like hedgehogs waiting for an aggression to occur? While some literature exists regarding fan attacks and reputation warfare (Champoux, Durgee, & McGlynn, 2012; Jagoda & Woermke, 2012), there is no literature about how a malevolent e-reputation warfare on online social networks can be initiated by creating an initial seeding population of engaged brand users. Scholars agree that virality and diffusion are not about community size and that smaller communities develop higher loyalty and more word of mouth (Scarpi, 2010). They also agree that the initial seeding population is the key to an efficient and effective viral marketing campaign (Liu-Thompkins, 2012). In this paper, we try to understand, through different experiments, how fake profiles (and by similarity real profiles) can be used to build online communities of engaged fans in order to maximize the diffusion of information and influence directly a higher number of fans. In our experiments, we show that the attacked company will not have immediate control over the transmission of rumors or information to engaged fans giving a head-start to the assailant. The same experiments can be reproduced with real Facebook accounts and the findings can be used as well to improve a company’s reputation.

Online Networks SAT.PM2

Social Media Data: Real Social Networks or Merely Technical Artifacts?

Juergen Pfeffer, Carnegie Mellon University, Momin Malik

Contact: jpfeffer@cs.cmu.edu

The proliferation of social media platforms like Facebook and Twitter has created an exciting new data source for scientific study. Millions of people self-report information about their characteristics and relationships, and their actions generate petabytes of trace data. Much of this data is available for free through APIs, making analysis of the structure and dynamics of large-scale social media systems feasible for a broad array of researchers. Indeed, innumerable social media publications flood scientific conferences and journals. However, several challenges arise from the use of these data, especially when we want to use them to discuss social science

research questions related to "real world" socio-cultural systems. There are multiple potential biases and filters that separate behavior represented on social media platforms from human behavior in general. We may ask: Do the people on these platforms represent society? Do the people behave within platforms in ways that generalize to how they behave elsewhere? Do the created data capture actual human behavior? Do the data available to researchers represent the platforms? The answers to these questions reveal critical issues present at every layer between human behavior and our analysis of social media data. In a nutshell, we argue that it is not easily possible to know whether, when we analyze social media data, we study society or the technical artifacts of software implementations.

Online Networks SAT.PM2

The role of opinion leaders in rumor diffusion on Twitter

Jieun Shin, University of Southern California

Contact: jieunshi@usc.edu

This study investigates how rumors diffuse on twitter focusing on the role of opinion leaders. Opinion leaders are known to pay close attention to mass media and pass on the actual media content to their family, friends, and acquaintances. Unlike traditional news media content, rumor usually diffuses by word of mouth without secure evidence. Therefore, opinion leaders may play a different role in rumor diffusion. To explore this research question, the present study specifically examined the rumor of President Obama wearing an earpiece that fed him answers during the third debate on October, 22, 2012. The study retrieved 1025 rumors that contained 'obama' and 'earpiece' in the body of texts between October, 22 to November, 22, 2013. The study constructed a directed retweet network, which contained 657 nodes with an average path length of 1.54. The network was characterized by high clustering coefficients. To inspect the micro level of the network structure, the study also examined the top 100 users with the highest measures on indegree, outdegree, betweenness, and eigenvector centrality. The original opinion leader literature argues that opinion leaders do not produce original content. Rather they relay information produced by those who have access to resources such as journalists. However, the analysis of the top 100 influentials excluding news media showed that opinion leaders also participate in producing content (i.e., rumor). In rumor diffusion, perhaps it is a grassroots push in which ordinary people participate in creating rumors and also at the same time diffuse them.

Social Networks and Health SAT.PM2

Social Networks and Health SAT.PM2

Neighborhood SES, Social Capital and Asthma

Jianmei Hao, University of Utah

Contact: hao.jianmei@gmail.com

Asthma is widely described as one of the fastest growing epidemics in the United States. The basic premise of my research is that socioeconomic characteristics of neighborhoods and social capital explain variations in Asthma rates that are not solely attributable to the aggregated demographic characteristics of individuals. In other words, the research is to address how the socioeconomic factors and social capital disproportionately affected Asthma. The objective of this paper is to examine the relationship between neighborhood socioeconomic status (SES), social capital and Asthma.

Social Networks and Health SAT.PM2

Demographic and Risk Characteristics of Social Support Networks among African American Gay Bisexual and Transgender (GBT) Youth attending Balls in the San Francisco Bay Area

Emily Arnold, University of California San Francisco, Lance Pollack, Adam Jonas

Contact: Emily.Arnold@ucsf.edu

Background: The House Ball Community (HBC) is an underground community of GLBTQ youth consisting of houses, family-like social networks, and the elaborate balls that they produce. A phenomenon that exists in cities across the US, scant research exists on this difficult to reach population and none on the social support network structures that may influence HIV-related norms and behaviors, particularly HIV risk. Methods: From 2011-2012, we collected surveys with N=274 participants of the Bay Area HBC. Eligibility criteria included: being African American, GBT-identified, ages 18-29, having attended a ball in the past 2 years, and having had sex with a man in the past 3 months. We collected egocentric social support network data and asked a series of demographic and behavioral risk items for each alter. Results: The majority of egos were ages 24-29 (75%), currently employed (58%), and had earned a high school diploma (45%). Approximately 18% were homeless in the past year, and 27% reported living with HIV. Mean number of social support alters was 2.45, density was 43.99%. 50% of the closest support alters were 30 or older, 18% were in the same house, and 75% were in the same gay family as the ego. 37% engaged in drug use with ego, and 27% engaged in both

drug use and penetrative sex with ego. Conclusions: Social scientists working with HBC members must understand the demographic and behavioral risk profiles of the members of the social support networks in order to develop effective intervention strategies for this population.

Social Networks and Health SAT.PM2

The association between sociometric choices and perceived group cohesion in a family-based group intervention for pediatric obesity prevention

Sabina Gesell, Wake Forest School of Medicine, Shari Barkin, Evan Sommers, Jessica Thompson, Thomas Valente

Contact: sgesell@wakehealth.edu

This study investigates the association between sociometric choices and perceived group cohesion measured with a psychometric scale. Two waves of data (Weeks 4 and 6) were collected from parents participating in a group-level childhood obesity intervention that met weekly for two hours in consistent groups to build skills in healthy family habits. Discussion and advice networks were measured at each wave as well as a previously validated Perceived Cohesion Scale (PCS, Bollen and Hoyle 1990). Participants were aided with a list of first and last names and pictures of group members in order to reliably distinguish individuals with the same name. Baseline data were collected at Week 4 when groups were closed to new members (11 groups, N=83). Random effects and fixed effects regression indicated that people who increased the number of discussion partners increased their perceived cohesion. People who had low advice nominations at Week 4 and increased them in Week 6 also reported increased cohesion. This is the first study to demonstrate how network changes affect perceived cohesiveness within a group setting. These results suggest that within a behavioral intervention, group dynamics measured by sociometric choices can predict perceived group cohesion. Many behavioral interventions designed to improve health outcomes are delivered in groups settings, with the aim of increasing network connectivity and building group cohesion (to ultimately accelerate the diffusion of desirable behaviors through the group); however, group dynamics and their effects on program outcomes are rarely evaluated. This study suggests that group interventions can generate interactions among members that have the potential to result in high perceived cohesion. The next step is to see how or if this mediates outcomes.

Social Networks and Health SAT.PM2

The influence of personal networks on body image and eating disorders

Paola Tubaro, University of Greenwich, Francesca Pallotti, Antonio A. Casilli, Thomas W. Valente

Contact: p.tubaro@gre.ac.uk

Body image distortions are a known feature of eating disorders. These distortions consist of a perceptual component – individuals' inability to correctly assess body size – and an attitudinal component – individuals' dissatisfaction with their body shape and weight. Body image is often a function of social factors such as fashion, advertising, and entertainment media. Yet little research has attempted to explain how these influences differentially affect individuals, and why reactions range from binge eating and obesity, to anorexia and extreme thinness. We use data from a web survey of 265 English- and French-speaking respondents with eating disorders, mapping their personal networks as well as their health condition, body image, reported weight and body-mass index. Network data include information on their broadly defined personal networks including, but not limited to, Internet-based networks. Body image is measured using Stunkard's figure rating scale. We estimate a bivariate ordered probit model to account for the joint distribution of perceptual and attitudinal body image distortions as a function of both individual attributes and personal network characteristics. We find that network effects matter, and in particular a modified measure of relational density accounting for both existing ties and affiliation to social circles. We also find that size and composition of personal networks have differentiated effects on body image depending on body-mass index. We interpret network effects in light of their capacity to induce informational improvements in terms of reliability and accuracy of health- and body-related information available to individuals.

Statistical Methods SAT.PM2

Statistical Methods SAT.PM2

Analysis, Visualization and Prediction of Network and Nodal Attribute Data

Isabella Gollini, [Department of Civil Engineering, University of Bristol, England](mailto:isabella.gollini@bristol.ac.uk), Brendan Murphy

Contact: isabella.gollini@bristol.ac.uk

Network data arise in a wide range of applications including social and biological sciences. In many cases a large amount of nodal attributes is also available. Nodal attributes and links are often in strong relation. For example, we may observe that nodes with similar attributes are more likely to link to each other and vice versa. We introduce a new class of latent variable models based on the latent space and factor analysis models which combine the information given by the network and the attributes observed on each node in order to analyze and visualize network data and predict missing links and nodes. The basic assumption is that the probability of a node being connected with other nodes and the behaviour of nodal attributes depend on the same latent variable. Network data are typically of large size and all the likelihood functions of the models proposed involve integrals that cannot be evaluated analytically. To overcome this problem we adopted a variational approach to estimation which turns out to be particularly efficient from a computational point of view. The effectiveness of this methodology is demonstrated on the analysis of a *Saccharomyces cerevisiae* (yeast) genes network dataset consisting of 1500 nodes and 80 different attributes for each node.

Statistical Methods SAT.PM2

Let the Cases Be Seen: Multiple Regression as a Problem in Network Analysis

Ronald Breiger, University of Arizona, Alessandro Lomi

Contact: breiger@arizona.edu

Conventional regression models make the “cases” invisible because the main analytical objectives are typically formulated in terms of hypotheses about relations among variables. Recent work has shown, however, that such modeling has a dual and may be turned “inside out:” the usual regression coefficients may in fact be usefully defined and computed from a network among the cases (R.L. Breiger and D. Melamed, “The Duality of Organizations and their Attributes,” *Research in the Sociology of Organizations*, 2014; D. Melamed, R.L. Breiger, E. Schoon, “The Duality of Clusters and Statistical Interactions,” *Sociological Methods & Research*,

2013). Research on network modeling, and insights from sociological field theory, may be applied to this network, and doing so leads to new discoveries about the organizational and relational underpinnings of regression models and their applications. We illustrate the potential of the new modeling framework to illuminate core issues in the study of peer effects in education by enriching and complementing a multiple regression study of the effects of individual characteristics on academic performance of 138 graduate students linked by networks of advice and friendship relations. We propose and test a new measure of homophily based on profile similarity. We show not only that the new measure predicts well network ties among the students, but also that such ties account for observed regression outcomes. In the discussion we generalize the empirical results of the study to argue that relationally-oriented students of social organization should transcend “general linear reality” by exploiting some of its analytical properties.

Statistical Methods SAT.PM2

Multiple-Item Measurement for Relational Construct Networks

Christopher Marcum, National Institutes of Health, Laura Koehly, Donald Hadley

Contact: cmarcum@uci.edu

Multiple item scales have long been used to measure latent constructs on individual-level data. This is appropriate when an otherwise unobserved construct is indirectly measured by combining various observable correlated characteristics that are thought to tap into slightly different dimensions of that factor. Network data, which consist of observations on the relationships between a set of actors, however, are typically drawn from single-relation measurements. While this approach is sufficient for learning about discrete relations (communication, collaboration, etc) it lacks the reliability of multi-item measurement on valued relationships, such as those of common interest to psychologists (cohesion, conflict, etc). In this paper, we evaluate the use of multiple-relationship measurement in inferring valued construct networks. First, we generalize the individual measurement of the relationship component of the Family-Environment Scale to be relational. Second, we adapt and calculate standard reliability statistics (Cronbach's alpha, Armor's theta, lambda_1) on the inter-relation graph correlation matrix and compare them across three common measurement routines (sum of relations, average of relations, and conditional multiplexity). Third, and finally, we evaluate the construct network as a predictor of health communication under both continuous and ordinal regimes in an exponential random graph model. Our empirical data come from the Outcomes of Education and Counseling for HNPCC/Lynch Syndrome Testing Study.

Statistical Methods SAT.PM2

Network analysis and Graphical Models: a taxonomy of environmental contrasts

Maria Caterina Bramati, Sapienza University of Rome

Contact: mariacaterina.bramati@uniroma1.it

This research aims at providing a taxonomy of human contrasts involving environmental resources, with a methodology based on Bayesian networks (BNs - Cowell et al., 1999). The main idea is to connect Social Network Analysis descriptive measures of centrality with a probabilistic approach to networks. Therefore, it is assumed a latent conditional structure of the network which shapes both the structural information and uncertainty characterizing the data. This is achieved by means of a Bayesian Network approach which allows reweighting the original adjacency matrix according to a latent network structure. Thus, traditional SNA measures for network description can be easily computed. The approach is illustrated using a dataset on Issue Correlates of War (ICOW) which contains claims in world politics for three dimensions of interests, land, river and sea (Hensel, 2001; Hensel et al., 2006a; Hensel et al., 2006b, Nemeth et al., 2006) for about 244 claims located in 5 world regions and observed from 1816 to 2001 (<http://www.icow.org>). Each node represents a country involved in single or multiple disputes over the use of natural resources. Therefore, each dyad is represented by an edge connecting the countries involved in the contrast. Each observed edge is a realization of random variables which are connected by a conditional latent structure. As an example, we consider the duration, the geographical location and the issue of the disputes as main variables characterizing the conflicts. Then, the statistical model provides a pictorial representation of dependence relations between variables by means of modular diagrams, namely Directed Acyclic Graphs (DAGs). The presence of an edge joining nodes in the DAG is interpreted as statistical dependence between variables. The network is 'learned' from data on international conflicts and the arc strengths are used as scores for building a new 'observational' adjacency matrix. Part of this research has been granted by EU-FP7 project Solutions for Environmental contrasts in Coastal Areas (<http://www.projectsecoa.eu>)

REFERENCES Cowell, R.G., Dawid, A.P., Lauritzen, S.L., Spiegelhalter, D.J. (1999). Probabilist Networks and Expert Systems. Springer, New York. Hensel, P.R. (2001). Contentious Issues and World Politics: Territorial Claims in the Americas, 1816-1992. *International Studies Quarterly* vol. 45 no. 1 81-109. Hensel, P.R., Mitchell, S.M., Sowers, T.E. II (2006a). Conflict Management of Riparian Disputes: A Regional Comparison of Dispute Resolution. *Political Geography* vol. 25, no. 4, 383-411. Hensel, P.R., Mitchell, S.M., Sowers, T.E. II, Clayton T.L. (2006b). Bones of Contention: Comparing Territorial, Maritime, and River Issues. Paper presented at the Annual Meeting of the American Political Science Association. [<http://www.icow.org>.] Nemeth, S.C., Mitchell, S.M., Nyman, E.A., Hensel, P.R. (2006). UNCLOS and the Management of Maritime Claims. Paper presented at the Annual Meeting of the International Studies Association, Chicago, IL.

Words and Networks SAT.PM2

Words and Networks SAT.PM2

A Journey Through History - Cultural Anthropology through Wikipedia

Patrick De Boer, MIT Center for Collective Intelligence, Peter Gloor

Contact: pdeboer@MIT.EDU

Articles about people in Wikipedia include many social cues about a particular person in different cultures and epochs – from today’s perspective. In the English Wikipedia we collected the roughly one million people pages, from the beginning of time, and in all cultures. To construct the social network of people, we collected each article’s contents and extracted the internal links to other people articles. Similarly to the Google page rank algorithm, this linking structure gives us a clue about which person is more prominent from the Wikipedians’ perspective. As metric of importance we took the ratio between in-degree and out-degree because having a higher in-degree might be a proxy for the power or importance of the person described in the article. Because the size of the original map was too huge, we only included articles having more than a predefined number of incoming links and those peripheral articles that have a direct link to the most prominent articles. To construct a temporal map of the “people network” through history and across cultures, we only included links between two people pages if the two people were living at the same time. Our people map starts with Ötzi the Iceman in 3300 BC and gets denser over time until reaching people alive right now.

Words and Networks SAT.PM2

Love Your Creatives - Mutual Admiration in a Network of Creative Writers

Peter Gloor, MIT Center for Collective Intelligence, Geoff Dutton, Lucas Broennimann

Contact: pgloor@mit.edu

We analyze the collaboration and readership network of cowbird.com, an online community of storytellers and photographers, comparing it with other collaboration networks such as the Wikipedia collaboration network. Cowbird members self-publish articles called stories on their own pages. A story is typically two to six pages long and may include text, images, and MP3 sound files. An author can tag story content to places, dates, people, and themes. As soon as a story is published, readers react to it by commenting, “loving” it (analogous to Facebook “likes”), “sprouting” a story of their own from it, or corresponding with the author through a private messaging system. Authors develop reputations over time, which can result in people joining

their "audience," members of which are notified whenever that author publishes a new story. Most authors seem to cherish feedback and like to see their audiences grow. Analyzing the read, "love", and sprouting network reveals a dense readership and collaboration network with no clear center. In particular, the typical exponential long-tail network, with a few stories claiming a disproportionate share of readers and "love" seems to be missing. This is very different from Wikipedia, which exhibits a near-perfect long-tail distribution. We explain this with the demographics of cowbird, where most readers are also authors, where each author on average read 65 stories, out of which s/he has loved more than half. We also study statistical word distribution and usage through "wordspaces" to predict future popularity and influence of stories.

Words and networks SAT.PM2

Personality and social networks: A bibliographic review

Evgenia Dolgova, Leeds University Business School

Contact: e.dolgova@leeds.ac.uk

How are individual differences related to the structure of social relationships? Multiple scientific disciplines offer explanations for how personality characteristics are related to patterns of social interaction. Although the nature of this quest is interdisciplinary, scholars are often constrained by the knowledge base of their discipline and publication requirements of their institutions, which limits the dialogue across different research fields. In order to integrate scholarship and findings scattered across different scientific areas, researchers need to be aware of findings generated by various fields. To foster the dialogue among scholars, we review the literature on personality characteristics that are related to the formation of social relationships, as well as the structure of the intellectual community that addresses these topics. We first carry out bibliographic analysis to map the structure of the intellectual community and observe how the interest in this research question shifted among various scientific fields. Then, we perform semantic analysis of the publications devoted to personality and social networks. The purpose of this review is to trace the emergence of publications on personality and social networks, identify driving factors of this field's evolution and point out potential challenges that stand in the way to knowledge integration. We also outline the potential future research areas that could contribute to our understanding of why people relate to each other differently.

Words and Networks SAT.PM2

Building Meaning: Vocabularies, Social Networks and Material Practices

Candace Jones, Management and Organizations Dept, Boston College

Contact: candace.jones@bc.edu

Vocabularies are the system of words and their meanings commonly used by social collectives (Loewenstein, Ocasio & Jones, 2012). Vocabulary structure—the frequency of key words, their relationship to one another and their relationship to exemplars—and semantic meaning may vary by actors' social networks. For instance, European functional modernist architects such as Mies van der Rohe and Le Corbusier served commercial clients, used technology and economic analogies and focused on new materials of steel, glass and reinforced concrete whereas Modern Organic architects, such as Frank Lloyd Wright and Eliel Saarinen served institutional and residential clients, used nature analogies and integrated wood and stone with concrete and steel (Jones, Maoret, Massa & Svejenova, 2012). Yet, there is little empirical research that examine how language and social networks shape meaning and practice of the same phenomenon—a building. We examine texts written by architects, their social networks and their buildings. We focus on modernism from 1890 through 1939 when new materials are introduced, became accepted and end the beginning of World War II. Jones, C., Maoret, M., Massa, F. G., & Svejenova, S. 2012. Rebels with a Cause: Formation, Contestation, and Expansion of the De Novo Category "Modern Architecture," 1870–1975. *Organization Science*, 23: 1523-1545. Loewenstein, J., Ocasio, W., & Jones, C. 2012. Vocabularies and vocabulary structure: A new approach linking categories, practices, and institutions. *Academy of Management Annals*, 6(1), 41-86.

Posters SAT.PM3

Poster SAT.PM3

Use of social network analysis tools to document collaboration for inter-institutional translational research

Meltem Alemdar, Georgia Institute of Technology, Christopher Cappelli, Leo Andres, Tabia Akintobi, Anika Dodds

Contact: meltem.alemdar@ceismc.gatech.edu

The Atlanta Clinical and Translational Science Institute (ACTSI) is a multi-organizational infrastructure that aims to foster the rapid and efficient translation of scientific discoveries to community practice through research collaboration, training, and community engagement. A primary goal of the ACTSI is to engage and foster collaboration among clinical researchers, basic scientists, public health researchers, community-based practitioners, and private sector partners to foster translational research across diverse disciplines, organizations, and three partner institutions (Emory, Georgia Tech and Morehouse). One way to demonstrate collaboration is through the use of social network analysis (SNA) tools. SNA has long been used for objectively characterizing collaboration networks (Otte & Rousseau, 2002). In this study, research collaborations among partner institutions will be assessed using a SNA approach over a four-year period (2013-2017). The data used for this research will be drawn from the project's SNA survey and from secondary data sources used by the ACTSI for tracking investigator publications and Internal Review Board (IRB) submissions. Prior SNA research within the ACTSI showed increasing collaboration among the three partner institutions between March 2007 (pre-ACTSI) and March 2009. This study seeks to show if the pattern of collaboration between partner institutions has changed. Additionally, this study will provide a basis for assessing longer-term contributions of support to scientific discovery and transdisciplinary science. We will also discuss the challenges that we have experienced throughout the process of conducting a SNA study as part of a complex, multi-organizational infrastructure program.

Poster SAT.PM3

Examining the Context in Agenda Setting: President Obama and the Muslim Religion

Mariam Alkazemi, University of Florida, Wayne Wanta

Contact: alkazemi@ufl.edu

One area in mass communication research deals with the agenda setting function of the mass media. The first level of agenda setting suggests the transfer of object salience from the media to the public. Hundreds of studies have found support for first-level agenda setting, including research designs that examined an entire “agenda” of issues (McCombs & Shaw, 1972) and individual issues (Winter & Eyal, 1981). The second level of agenda setting explained that survey respondents linked both cognitive attributes and affective attributes to candidates based on how often those attributes were mentioned in the media (McCombs, Lopez-Escobar & Llamas, 2000; Golan & Wanta, 2001). The application of social network analysis to agenda-setting effect has resulted in an examination of cognitive networks in the human memory (Guo, Vu, & McCombs, 2012). In the third-level of agenda setting, social network analysis demonstrated a statistically significant correlation between matrices summarizing media content and matrices summarizing survey data. Surveys show that a significant number of individuals in the U.S. misidentify President Obama as being a Muslim. Using affiliate networks, the current study explores under which contexts the association of Obama with Islam occurs. To examine a potential third-level agenda setting effect and linking of the attribute of the Muslim religion to President Obama, a content analysis of 387 news articles was conducted and compared with survey results. Data were collected from seven newspapers from various regions across the United States.

Poster SAT.PM3

Online Social Networks and Support: How LGBT Youth Use Facebook.

Michelle Birkett, Northwestern University, Bernie Hogan, Brian Mustanski

Contact: birkett@northwestern.edu

Lesbian, gay, bisexual, and transgender (LGBT) youth are at greater risk for negative health outcomes due to increased victimization and stress [1-3]. However, the relationships these youth hold have been shown to be important protective factors. Online networks, in particular, are important for LGBT youth. 97% of teenagers regularly use the internet, and 80% of these teens regularly use Facebook or another online social networking site [4]. As LGBT youth are often isolated and have low support resources in their everyday lives [5], online networks have been shown to be ideal places to seek support and important information, such as peer

messages about identity development and health behavior [5-7]. Little is known about how LGBT youth use social networking sites, therefore formative research about the online networks of LGBT youth is necessary. Additionally, as online networks are frequently an environment for individuals to shape their own social support system through their decisions on who to connect to and what information is shared [8], understanding network differences will be important for informing understandings of relationships and resilience. This project proposes to describe the online networks (Facebook networks) of LGBT youth and analyze how these youth utilize these online networks for support. Specifically, the Facebook networks of 246 LGBT youth are currently being collected via an innovative Facebook Application Programming Interface (API), NameGenWeb. This data, along with already collected longitudinal data on mental health, support, and internalized homophobia, will be utilized to examine the protective influences of online connections. As Facebook ties are drawn almost exclusively from offline friendships [8], the use of Facebook to collect network data enables the rapid collection of an online network in the size and scope of one's personal network, with minimal respondent burden. The current research study is part of a larger longitudinal cohort study of 248 diverse (48.4% Black; 18.9% White; 12.3% Latino; 20.5% Multiracial/Other) LGBT youth. Participants were between the ages of 16-20 (mean age = 18.5) at baseline and 8 waves of interviews have already been collected (approximately every 6 months). Excellent retention has been obtained (91% at 1 year, 83% at 4 years). While the collection of Facebook networks is currently ongoing and scheduled to complete this winter, preliminary results indicate that LGBT youth differ greatly in their use of their online networks for support.

Poster SAT.PM3

Understanding conduits for disease transmission: Integrating human and physical geography in western Uganda communities

Laura Bloomfield, Stanford University

Contact: labloom@stanford.edu

Proximity and orientation of agents provide information about the probability that disease transmission and infection will occur. However, these spatial factors are by no means definitively predictive of contact or disease exchange occurring. Perhaps of even greater importance than the physical relationships of individuals in the disease transmission equation, are the demographic characteristics, social relationships and interactions that overlay the landscape. Very minimal research has aimed to integrate the geographic and behavioral factors that contribute to disease incidence in a spatially explicit manner. In part, the lack of research in this area is tied to a lack of methods that integrate different scales of exposure data as well as comparable units of measurement for how individuals change their physical space and consequently how space interacts with behavior. A number of studies have illustrated how degraded natural landscapes increase the number of conduits for disease; others have

documented how topography and function of landscape features have significant effects on behaviors that are linked to health outcomes, such as obesity. However, a way to rigorously integrate landscape features with behaviors in an infectious disease context has not been accomplished. Integrating social and landscape data from five communities around Kibale National Park, Uganda, we draw upon metrics from social network theory and landscape features to understand pathways for potential disease transmission. Although these models will not illustrate the entire context of disease transmission, they will provide an initial framework for understanding the multi-dimensionality of the spatio-behavioral substrate underlying disease transmission in human communities.

Poster SAT.PM3

Impression that last: The lasting impact of social identity on knowledge seeking networks

Katerina Bohle Carbonell, University Maastricht, Karen Könings, Jeroen van Merrienboer, Mien Segers

Contact: k.bohlecarbonell@maastrichtuniversity.nl

Teams are prone to subgroup formation hindering the creation of a shared mental model. Social identity, how much an individual feels attached to the team, influences the building of a shared mental model. Research has shown that prototypical group members have a central position in teams. Prototypical team members feel highly attached to the team, resulting in them embodying the team's values and behaviors. This study aimed at investigating how social identity influences knowledge sharing networks. 13 small student teams working on an advice project for a company were surveyed. Social identity was measured at the beginning of the project and knowledge sharing network at the end. The in-and outdegree were calculated to distinguish between team members who play an active role in the creation of the final product and those who are only peripherally involved. The means of 3 groups (no, low, and high social identity) were compared through an ANOVA, controlling for non-independence of observations. The mean out-degree of team members differed significantly between each other ($F = 8.363$, $p < .001$), but there was no significant difference in in-degrees. Individuals who feel attached to the team more often seek out team members to ask for work-related information. These individuals thus actively try to collect the knowledge necessary to complete the project.

Poster SAT.PM3

The Influence of Social Networks of Domestic Violence Shelter Staff on the Adoption of an HIV Sexual Risk Reduction Intervention for Domestic Violence Shelter Residents

Courtenay Cavanaugh, Rutgers University, Gina Wingood, Tom Valente

Contact: cocavana@camden.rutgers.edu

Women who experience intimate partner violence (IPV) are at elevated risk for contracting HIV through high-risk heterosexual contact. However, there are currently no evidence based interventions (EBI's) for reducing HIV risk among women who experience gender based violence including IPV. We study the adaptation of an EBI for reducing HIV risk, Sisters Informing Sisters about Topics on AIDS (SISTA), for women in domestic violence (DV) shelters and whether the social networks of domestic violence shelter staff influence the adoption and implementation of the adapted SISTA intervention. This presentation will describe the social network information collected from directors, administrators, and case managers from two domestic violence shelters in a North East Coast metropolitan city area. Shelter providers were asked about their social networks inside and outside the shelters. For example, they were asked which coworkers they talk to about HIV prevention services and whether they know anyone outside the shelter who is HIV positive. Descriptive data about the social network information reported will be reviewed. Ideas for analyzing this information in the context of the other study data collected will be discussed. Attendees will be asked to provide further suggestions for using the social network data collected in combination with other study data to further the scientific literature in this area.

Poster SAT.PM3

Unraveling the Effects of Various Knowledge Networks on Innovation

Jennifer Chandler, California State University, Fullerton, Andrew Yu

Contact: jechandler@exchange.fullerton.edu

Knowledge networks have long been recognized as sources of innovation, with much of the emphasis of this research focusing on knowledge transfer. However, these studies typically assume that knowledge flows within these networks are largely homogeneous. We suggest that there are differences in the types of knowledge networks that uniquely contribute towards innovation, and, as a result, that an individual's prominence across different knowledge networks can influence his or her innovative performance. Our findings suggest that prominence in tacit knowledge networks positively influences innovative performance, while prominence in explicit knowledge networks negatively influences innovative performance. In

other words, we argue that knowledge is not always equal, especially when it comes to innovation. We discern among the social behaviors of these individuals and how these social behaviors may enable these individuals to gain prominence in different types of knowledge networks in the same organization. With a 100% response rate on a roster recall survey of six main questions, our study unveils different types of knowledge networks that are embedded within a firm. The setting for this study is a US-based high technology firm specializing in engineering and science. The firm was founded in 1985 and at the time of data collection was 25 years old and held approximately 20 patents, with another dozen in process.

Poster SAT.PM3

Pain after Total Knee Arthroplasty: A Social Network Analysis of Perioperative Teams

Catherine Dietrich, Department of Anesthesiology, University of Florida, Russell Bernard, Roger Fillingim, Patrick Tighe

Contact: cadietrich@anest.ufl.edu

Up to 60% of patients experience severe pain after undergoing a total knee arthroplasty (TKA). Factors such as age and gender have a known effect on pain outcomes; perioperative teams may also influence pain. To study the relationship between postoperative pain and perioperative teams, we built a network in ORA (CASOS, Carnegie Mellon University) for TKA procedures with the surgeons, anesthesiologists, and nurses as nodes linked by cases they worked together. We normalized the link values to account for the variation in the proportion of cases with severe pain outcomes among different teams. Through the normalization process, the normalized network's links were stronger when TKA collaborations were associated with more pain events per the total number of cases worked. We also obtained the total degree centrality for each node. Our analysis focused on the independent contribution of team network factors to severe pain outcomes. A few nodes within the raw network were isolates in the normalized network and had no association with severe pain outcomes. The raw network had overall higher centrality scores, and the identity of the highest ranked nodes by centrality values varied between the networks. Being well connected did not directly correlate to having the highest associated pain scores. However, the variation between the networks does demonstrate an association between certain members and a higher proportion of severe pain outcomes. Social network analysis of perioperative teams offers insight into the targeting of efficient practice change efforts to lower severe pain outcomes.

Poster SAT.PM3

Network Analysis and Global Wildlife Trade: A New Approach to Understanding a Major and Growing International Issue

Yogesh Dongol, Florida International University

Contact: ydong005@fiu.edu

An understanding of the roles, connectedness and relationships of countries embedded in wildlife trade networks - as oppose to the isolated role of any particular country - will help to improve the effectiveness and efficiency of interventions aimed at reducing externalities (e.g. zoonotic disease emergence, invasive species, etc.) related to global wildlife trade. Using data from the World Conservation Monitoring Center, we examine global, legal wildlife trade networks for mammals, birds, reptiles and plants through the theoretical and methodological approach of network analysis. This approach has been used previously to discover network characteristics for various applications (e.g. airline travel), but this is the first application of which we are aware for wildlife trade. The results show many functional roles and hotspots and hubs of wildlife trade, and highlight many small world properties of networks and scale free or power law distributions of connections and volumes of trade between countries and regions. The network architecture found here further suggests extreme vulnerability of the connected world because of the high potential for spread and the continuation of disturbances. We also point out both the roles and responsibilities of global hotspots and hub countries.

Poster SAT.PM3

Exploring the impact of genetic testing on social support networks among families at risk for a heritable cancer syndrome

Dina Eliezer, National Institutes of Health, National Human Genome Research Institute,
Christopher Marcum, Donald Hadley, Laura Koehly

Contact: dina.eliezer@nih.gov

Genetic testing is a family centered process. Family members often receive genetic testing together and may rely on each other for support upon receiving unfavorable test results. Despite the importance of the family in the context of genetic testing, past research has rarely examined the impact of genetic testing on relational outcomes. The small body of research that has examined relational outcomes mainly focuses on family members who received genetic testing and not on the substantial number of family members who declined testing. The current research uses both descriptive and statistical social network methods to examine the structural characteristics of familial support networks among individuals who received or declined

genetic testing for Lynch Syndrome (LS), a dominantly inherited condition associated with elevated risk for cancer (e.g., colorectal, endometrial, stomach). We compared differences in node-level indices (i.e., in-degree, out-degree, reciprocity, and transitivity) of supportive relationships among genetic test receivers and genetic test decliners. Additionally, we used exponential random graph models to evaluate whether supportive ties are more likely among homophilous pairs (both genetic test receivers or both genetic test decliners) than heterophilous pairs. Likewise, we assess whether transitive support relationships are more likely among homophilous than heterophilous triads. Finally, we assess whether genetic test acceptors receive and provide more support than test decliners. Our results are discussed in terms of the empirical and clinical implications of genetic testing for family relationships.

Poster SAT.PM3

Best Practices Model Based on aGap Analysis of the SocialServices Network in Worcester,MA

Annivette Fernández-Rivera, Clark University & Worcester Division of Public Health

Contact: afernandezrivera@clarku.edu

Commercial sex work has been problematic in the second largest city of New England for decades. An investigation on the presence of female sex workers in Central Massachusetts has highlighted the lack of social services provided to this population. Commissioned by the Worcester Division of Public Health (DPH), and as part of a broader collaborative effort among social service organizations (SSO), this study maps out the referral network among the SSOs. By analyzing the network we identified several gaps in the services provided which led to the creation of a model of efficient services based on domestic and international best practices. With a network density of 0.07, an average betweenness of 51.027, a closeness of 0.012 and an eigenvector of 0.027 among the SSO organizations, our findings suggest there are three main gaps: (1) lack of knowledge, (2) lack of communication, and (3) insufficient capacity and services. Above all, this report illustrates the need for an ongoing body, like the Worcester Alliance Against Sexual Exploitation (WAASE) to critically examine the proposed recommendations and support the development, implementation and monitoring of a coordinated county wide response to sexual exploitation among sex workers in Worcester.

Poster SAT.PM3

Visualizing respondent-driven sampling (RDS) recruitment chains in Pajek

Jacob Fisher, Duke University

Contact: jcf26@duke.edu

This poster presents a method for visualizing trees in Pajek. Using recruitment chains from sample of female sex workers in China collected using respondent-driven sampling (RDS), the poster illustrates: (1) how to arrange the trees vertically with vertices aligned by distance from the root vertex, and (2) how to space the leaf vertices appropriately. Spacing for resized vertices will be addressed. By providing a clear, step-by-step method for visualizing trees, future visualizations of recruitment chains and other tree structures can be improved.

Poster SAT.PM3

Control within a Social Network

Theodore Fong, , Chris Arney, Kathryn Coronges

Contact: Theodore.fong@usma.edu

We investigate the concept of control in a social network. In a classic sense, we think of influence in the social world, but the question we seek to understand is whether control, the more robust ability to drive a dynamical system to a desired final state, is possible in some forms of social networks. We use a combination of methods to include Barabási's algorithm using degree distribution to predict a network's controllability. We seek to identify the driver nodes -- the nodes, if driven appropriately, will provide a measure of control over the network. We test our algorithms on military organization social networks with the complications of multi-dimensionality, bi-directional components, dynamic structures, and the varied and different social forces that effect individual behavior.

Poster SAT.PM3

Networks for public health improvement: collaboration patterns of a Brazilian government production laboratory

Bruna Fonseca, Federal University of Rio de Janeiro (UFRJ), Marcus Vinicius Fonseca

Contact: bruna.fonseca@pep.ufrj.br

Collaborative networks are essential for achieving a high degree of product and process innovation. In the Brazilian public health system (SUS) this is especially important as innovations can contribute to the reduction of government spending, decreasing the balance of trade deficit, stimulating national development and increasing access to good quality products, of high technology content. Fiocruz, the most prominent public health institution in Latin America, plays a major role in SUS, particularly through its production laboratory, Bio-Manguinhos (Bio-M). Based on its pivotal role as an innovation agent in SUS, the understanding of Bio-M collaboration pattern is essential for the strategic planning and management of public health policies. In this work, social network analysis was used to study patent and publication networks involving Bio-M. Co-authorship network data were retrieved from national and international databases, analyzed and processed in order to standardize information from authors and institutions. Network visualization and analysis showed that universities are top Bio-M collaborators, but other research units from Fiocruz are its most frequent collaborators. National institutions lead the patent partnerships, but international partners are equally present in publication networks. Institutions and internal gatekeepers could be identified, as well as authors playing major roles as Bio-M partners. Network analysis generated new and valuable information on Bio-M network patterns and processes. Further investigation of these patterns can support the development of a set of network indicators, as well as the strategic analysis of Bio-M partner's selection, providing insights into the most adequate partnerships for improving public health in Brazil.

Poster SAT.PM3

Watch And Learn: Activity Contagion in an Online Genealogy Network

Jeremy Foote, Purdue University, Seungyoon Lee

Contact: jdfoote1@gmail.com

This paper applies the theory of Legitimate Peripheral Participation (LPP) to explain the distinctive power-law distribution of participation in an online collaborative knowledge platform. LPP claims that observing and interacting with other members is an important step in helping novices learn the norms and skills needed to become part of a community of practice.

Data were collected from WeRelate.org, an online genealogy community which uses MediaWiki software to organize and track user contributions. Preliminary analysis indicates a curvilinear relationship between the ratio of edits a user makes in more complex category types and their activity level, with the peak at about 40% of edits being in complex categories. Both kinds of talk are negatively associated with activity. This provides some evidence that there is some learning of both skills (how to edit complex pages) and norms (don't talk - just work). Further analysis will be conducted to examine how participation is influenced by users' involvement in three different types of networks - an exposure network (i.e., viewing content written by others), a local communication network (i.e., communicating with others on a user's or content page's talk page), and a community-level communication network (i.e., communicating with others on a community-wide discussion page). We will use longitudinal actor-oriented statistical models to examine the contagion of activity levels among users through these networks. The study provides implications for understanding the processes and dynamics of member participation in collaborative volunteer communities.

Poster SAT.PM3

Scalable Estimation of Temporal ERGMs with DNR Structure from Egocentrically Sampled Data

Ben Gibson, <div class="gmail_quote">Department of Sociology, University of California, Irvine</div>, Yue Yu, Zack Almquist, Carter Butts

Contact: cbengibson@gmail.com

There has been increasing interest in developing models for statistical dynamics from panel data. Current approaches assume one of two scenarios: data are not sampled (complete data are available) and there is no missingness; or, if missingness exists, the entire graph can be simulated (i.e., latent missing data methods). Zero missingness is a rare occurrence, and indeed most available network data in large population contexts is egocentrically sampled. Models that assume that the unobserved portion of the graph can be simulated are computationally intensive, and simulating very large graphs is often infeasible. Here, we develop and test an approximate method for TERGM inference in the case of models with dynamic network logistic regression (DNR) structure that estimates parameters from egocentrically sampled panel data without having to 1) assume complete graph data or 2) impute the portion of the graph that is missing. Using our techniques, we estimate DNR model parameters for sexual contact networks from panel data sampled from a large simulated social network (over 40,000 nodes) with known parameters. Using a model family with terms known to be important in the case of sexual contact networks (including mixing effects, alters' degree, and temporal effects), we test the adequacy of our approach by comparing parameters estimated from the model with the (known) true parameters. Potential advantages of our technique include the ability to estimate DNR parameters for very large networks with egocentrically sampled panel data and the

enhanced ability to estimate parameters for fully measured dynamic networks at greatly reduced computational cost.

Poster SAT.PM3

Tweeting about health care: A social network analysis of Kaiser Permanente's Twitter handles

Heather Jane Hether, University of the Pacific

Contact: hhether@pacific.edu

Health care organizations are increasingly relying on social media to communicate with their key publics and to facilitate community-building among their stakeholders. However, few studies have mapped the structure of the online communities formed around health care organizations. The current study is a social network analysis of the tweets exchanged for six weeks among one of the largest integrated health care delivery systems in the United States, Kaiser Permanente, and members of its key publics. The networks around three of Kaiser Permanente's Twitter handles are analyzed to better understand how these platforms are used by the organization and its key publics. The paper compares the structures of these three related networks to examine how they vary and whether there is overlap in network participation. The implications of online communities formed around health care organizations are discussed.

Poster SAT.PM3

Social network structure and sustainable practice adoption in California winegrapes

Vicken Hillis, University of California, Davis, Mark Lubell

Contact: avhillis@ucdavis.edu

Agricultural sustainability is increasingly important in the context of a growing human population, dwindling non-renewable resources and increasing climate uncertainty. For many crops, although sustainable management practices have been identified, persuading farmers to adopt them is a greater challenge. Here we hypothesize that social network structure plays a key role in a farmer's decision to adopt a sustainable practice. More specifically, we hypothesize that the type of network structure best suited to facilitate the adoption of a sustainable practice depends on the cost-benefit ratio of the practice in question. Certain sustainable practices, those for which the private benefits of adoption exceed the private costs, are constrained mainly by an access to information. We hypothesize that open network structures are best suited to the adoption of these types of sustainable practices. Other sustainable practices, those for which the private benefits of adoption do not outweigh the private costs, embody a social dilemma, and are constrained mainly by resolving the collective-action problem involved. We hypothesize

that closed network structures are best suited to the adoption of these types of sustainable practices. We test our hypotheses using exponential random graph models and data collected using surveys of winegrape growers in three regions of California. The data include 44 adoption decisions made by each winegrape grower as well as network ties among growers representing shared information. Our findings have important implications for designing effective extension and outreach programs that increase agricultural sustainability.

Poster SAT.PM3

Twitter Conversations as Network Structures: Typology and Measurements

Itai Himelboim, Department of Telecommunications Grady College of Journalism and Mass Communication University of Georgia, Marc Smith, Ben Shneiderman, Lee Rainie

Contact: itai@uga.edu

When crowds gather in Twitter they form social media networks built from connections created when they follow, reply and mention one another. This paper identifies, empirically and conceptually, six types of conversations on Twitter based on their network structures. Polarized crowds - two distinct clusters with few connections between them - emerge when political issues are being discussed. Forming a single dense group of highly connected people, community in-groups are often focused on technical, professional, or specialist topics. When people talk about popular topics and brands they often form a pattern that looks like many islands, because only a few of them form connections with one another. These brand followers are isolated people who talk about a topic but not to each other. Breaking news and popular topics often form community clusters which form several small dense clusters of conversations and connections that run alongside a stream of disconnected people. Broadcast networks are often centered on prominent commercial and highly followed social media personalities, creating star-shape structures. The ends of the spokes in these networks are the audience members, users who re-tweet and mention these personalities, creating many arrows that point inward at the hub. A final pattern is the inverse of the broadcast network: the support network has a hub that replies-to many spokes, often customers who complain or seek support from a business. These patterns represent distinct ways people organize themselves based on their choices of who to reply to and mention.

Poster SAT.PM3

Divergence in leader and follower perceptions of emergent leadership networks: antecedents and implications

Samantha Holland, George Mason University

Contact: samahol@gmail.com

In leaderless groups, emergent leadership networks are commonly constructed from either the follower perspective (e.g., "Who do you rely on for leadership?") or the leader perspective (e.g., "Who do you provide leadership to?"). The implicit assumption behind this measurement strategy is that the same leadership network will be constructed by both approaches. Meta-analytic evidence of a systematic discrepancy between leader and follower perceptions of leadership relationships from the LMX literature (Sin, Nahrang, & Moregeson, 2009), however, brings this assumption into question. The purpose of this submission is three-fold. First, we offer results QAP analyses showing, on average, only modest correlations between leadership networks constructed from the leader and follower perspectives. Second, we explore the role of deep and surface level characteristics of group members as potential drivers of these discrepancies between networks. Finally, implications of leader-follower perceptual disconnects for leader identity construction, leadership effectiveness, and group outcomes are discussed.

Poster SAT.PM3

RENATO: Rapid Ethnographic Network Analysis Tool

Christopher Hopkins, Charles River Analytics, Steve Borgatti, Dan Halgin, Brian Prue, Christopher Hogan

Contact: chrishopkins@gmail.com

In this presentation, we introduce the Rapid Ethnographic Network Analysis Tool (RENATO), a software package for the analysis of relational data such as found in social network analysis and cultural domain analysis. Historically, researchers have used a combination of packages, including Anthropac, a DOS-based cultural domain analysis program. Anthropac requires a DOS emulator to run under modern Windows operating systems, which can be problematic for many operational users. RENATO builds upon Anthropac's capabilities, integrating network and cultural domain techniques with powerful visualization and database storage capabilities. Additionally, RENATO includes Android-based data collection components that support structured knowledge elicitation using a mobile device. For example, RENATO facilitates collecting a set of names (e.g., a list of gang members, a list of drug names) and enabling a respondent to use gestures to visually indicate relationships among them. The RENATO system

uses a central data repository and desktop, thin-client, and mobile interfaces to provide a variety of functions, including: 1) a data collection designer for creating collection tasks such as freelist, selecting from rosters, pilesorting, and paired comparisons, along with traditional survey methods; (2) a server for storing and sharing collection designs and the results of collections; (3) Android apps for executing the data collection on handheld devices and upload the results to a RENATO server; (4) a desktop client for performing detailed analysis such as multidimensional scaling, consensus analysis, clustering, and centrality measures; and (5) thin-client interfaces to browse data sets, perform lightweight analysis, and bundle subsets of the data for analysis.

Poster SAT.PM3

Reviewing friendship-networks and adolescents' risky health behaviors in studies using social network analysis and Add Health data

Kwon Chan Jeon, Texas A&M University, Patricia Goodson

Contact: kc_jeon@hlkn.tamu.edu

PURPOSE: To systematically review studies of the influence of friendship networks on adolescents' risk behaviors, which utilized social network analysis (SNA) and Add Health data (a nationally representative sample). **BACKGROUND:** Documented trends in health-related risk behaviors among adolescents have revealed fluctuations over time. Studies indicate relationships among mutual friends are a major influence on adolescents' risky behaviors. SNA can help understand friendship ties affecting individual adolescents' engagement in these behaviors. Moreover, a systematic literature review can synthesize findings from a range of such studies, as well as assess these studies' methodological quality. Review findings also can help school health educators develop more effective programs, because most adolescents' friendship networks occur in schools. **METHODS:** We employed the Matrix Method to synthesize and evaluate 14 published studies that met our inclusion and exclusion criteria (retrieved from Medline, Eric, PsycINFO, and Inter-university Consortium for Political and Social Research [ICPSR]). Moreover, we assigned each study a methodological quality score (MQS). **RESULTS:** Eight studies examined the relationship between drinking alcohol and friendship networks; seven studies, smoking; and three studies, sexual intercourse. In all studies, networks promoted risky behaviors. The average MQS was 6.53, an indicator of good quality (scale: 1 - 9). **CONCLUSIONS:** Better understanding of risky behaviors influenced by friends can be useful for school health educators and staff, as more effective prevention programs are needed to target risky behaviors of adolescents. Additionally, the overall MQ of these reviewed studies was good, as average scores fell above the scale's mid-point.

Poster SAT.PM3

Differences in social network structure and support in women in violent relationships

David Katerndahl, University of Texas Health Science Center at San Antonio, Sandra Burge, Robert Ferrer, Johanna Becho, Robert Wood

Contact: katerndahl@uthscsa.edu

While social support decreases the risk of getting into a violent relationship, it also allows battered women to remain in violent relationships by reducing the negative impact of violence. The purpose of this study was to compare size, structure and support of social networks of women in abusive relationships with those of non-abused women. 42 women from 6 primary care clinics who reported partner abuse in the prior month were enrolled along with a demographically-matched comparison group of 14 women in non-abusive relationships. Participants described their social networks and rated the strength of support given and received by each dyad within the social matrix. Analyses compared networks in terms of centrality, agent characteristics, reciprocal ties, and triad census. Networks of women in abusive relationships were smaller in size, but more efficient in their ability to reach members, than those of non-abused women. Proportionally, networks of abused women had more women but fewer in-laws than those of comparison women. The women in these abusive relationships had higher measures of centrality, suggesting that they were more critical in holding their networks together. Yet, they had fewer social contacts and provided more support than they received with fewer reciprocated ties. Based upon Balance Theory, triad census found that networks of women in abusive relationships had fewer expected triads than those in non-abusive relationships. In conclusion, social networks of women in violent relationships are small and offer less support than those of comparison women. However, access to resources may be available through these networks.

Poster SAT.PM3

EgoWeb 2.0: Open-Source Software for Collecting and Analyzing Network Data

David Kennedy, RAND Corporation, Harold Green, Kayla de la Haye

Contact: davidk@rand.org

This poster will provide information about the development and use of the software Egoweb 2.0 as well as a demonstration of the software. EgoWeb is open-source survey software originally designed to facilitate the construction of surveys customized for the collection of personal network data and has recently been modified to collect data about complete networks. The collection and analysis of personal network data can be challenging for investigators,

interviewers, respondents and data analysts. Researchers at the RAND Corporation and UCLA have collaboratively developed EgoWeb to reduce the burden of collecting and analyzing personal network data. EgoWeb runs on a web-server and can be used to collect network data in the field on laptops and iPads. It can also collect respondent-entered data through email invitations. Names of alters can either be entered from scratch or chosen from a list of eligible alters. EgoWeb has extensive skip-logic and a variety of question presentation options to reduce the burden of collecting cognitive network data in which respondents must provide many assessments of network composition and structure from memory. EgoWeb exports data in a format to conduct multi-level dyadic analysis in which both respondent level network composition and structure variables can be analyzed along with alter level characteristics and relationship level variables. Recent EgoWeb developments include extensive presentation options for network visualizations during interviews in order to collect qualitative data from respondents about their own personal networks. RAND and UCLA researchers are continuing collaborate with network researchers to enhance EgoWeb with new features.

Poster SAT.PM3

Sustainability Networks of the Future: Applying Network Theory to Encourage Energy Conservation Behavior

Ksenia Koroleva, Rotterdam School of Management Erasmus University

Contact: koroleva.ksenia@googlemail.com

The integration of variable energy resources (such as solar, wind, electric vehicles, etc.), their producers and consumers (now often called 'prosumers') into the energy landscape of the future leads to decentralization of energy production and demand-supply imbalances. As 'prosumers' are largely driven by environmental welfare rather than rational economic considerations, this problem can be alleviated by integrating 'prosumers' into a network where they can observe the behavior of others and thus adjust their own energy-related behaviors. The question we ask is: how can the network be leveraged to encourage 'prosumers' to conserve energy? Theoretically, we adopt network perspective to analyze the properties of the relationships between 'prosumers', as well as the configurations of their networks in their impact on energy conservation behavior. Empirically, we conduct an experiment through a Facebook application where participants are presented with their own energy consumption information vs. that of their social network. The aim is to disentangle the impact of social network as a whole, the position of the 'prosumer' in it as well as the properties of the specific relationships on the intention to conserve energy, controlling for the general attitudes towards sustainable energy, control in energy consumption and perception of social norms. Our main hypothesis is that the ability of the 'prosumer' to influence another is determined by the structural position of this user in the network, moderated by the strength of the relationship with the user. The study is a research-in-progress.

Poster SAT.PM3

Dynamics of Information Propagation On Social Networks

Ingyu Lee, <p>Advanced Institutes for Convergence Technology</p><p>Seoul National University</p>, Byung-Won On

Contact: inlee3941@yahoo.com

Understanding the mechanics of information propagation becomes an important issue with the advent and popularity of social network sites such as YouTube, Facebook, Twitter, and Digg. Consequently, many researches have been done to model the mechanics of information propagation on the social network sites. However, most of the researches have been focused on the structural properties of the social networks using descriptive statistics and ignore the dynamics of social networks. In this paper, we present a simulation based empirical study on social graphs to understand the characteristics of information propagation on social networking sites using gossip algorithm. We used a publicly available social network graphs and personalized gossip algorithm to reflect the individual tendency of the nodes. According to our primitive experiments on subsets of Facebook, online social network graphs are much more dense than that of the traditional social graphs and requires much less time steps to propagate the information to the majority of the nodes in the graph.

Poster SAT.PM3

Peer Group Cohesion and Substance Use: How Social Cohesion Mediates Individual Delinquency and Peer Influences in Adolescent Friendship Networks

Jaemin Lee, Duke University

Contact: jaemin.lee@duke.edu

This paper examines whether and how adolescents' exposure to structural group cohesion mediates individual propensity and peer influence that lead to substance use. Previous research on delinquency in network perspectives examined structural group properties that are associated with delinquency but rarely investigated how global-level structural factors intervene in the relationships between individual-level variables and behavioral outcomes. Also, scholarship on substance use put an exclusive focus on social isolation rather than cohesive nature of friendship groups that may increase within-group monitoring and sanctioning. Using longitudinal data from the PROSPER (Promoting School-Community-University Partnerships to Enhance Resilience) project and network-based clustering methods to identify friendship groups, the present study tests a hypothesis that group cohesiveness functions as a magnifier of the effects of individual's delinquency and friends' characteristics on

substance use. The multi-level regression results support this hypothesis; substantively, even though substance use is a function of one's own propensity (e.g. smoking is cool) and their close friends' substance use, adolescents tend to be more deviant when they are embedded in a more cohesive-deviant group.

Poster SAT.PM3

Two Sides of the Same Coin: How Generating Well-Being in Others Can Harm the Givers while Benefiting the Recipients

Virginie Lopez-Kidwell, University of Texas, Dallas

Contact: Virginie.Kidwell@utdallas.edu

Recently well-being has gained attention as a measure of success beyond traditional economic indicators such as GDP or personal wealth. Workplace affective well-being encompasses positive psychological states experienced at work. Organizational research over the past two decades shows a strong relation between workers experiencing higher affective well-being and higher performance and positive work attitudes. For example, happy workers are likely to be more productive, engaged, satisfied, display prosocial and citizenship behaviors, and exhibit less turnover and burnout. However, what is really known about these happy workers? Many questions remain unanswered. For example, are our repeated formal and informal interactions with our coworkers a key source of well-being? Are employees with higher abilities to process emotions better suited to fill the roles of emotional providers spreading well-being to others around them? Furthermore, are there organizational benefits for well-being recipients; while, on the reverse side, does providing emotional well-being comes with hidden costs? Specifically, the focus is on the role of EA on the exchange of relational well-being (the receipt of liking, energy, pleasantness and emotional support), and in turn, the organizational consequences for recipients and providers alike in term of their occupational well-being affective organizational commitment. Using an organizational sample along with a social network research design, we attempt to answer the above mentioned questions. We discussed theoretical and practical implications bridging across the emotional abilities, social network and well-being literatures.

Poster SAT.PM3

ICTs in Individual and Interorganizational Networks: Two Peas in a Pod?

Weixu Lu, Doctoral student, School of Communication and Information, Rutgers, The State University of New Jersey, Punit Dadlani, Marya Doerfel

Contact: weixulu.comm@rutgers.edu

Social networks are an important part of interorganizational relationships (IORs) for accessing resources like advice, building up alliances, and leveraging power or coalitions, to name a few. IORs are often created through resource dependence between organizations. However, IORs are not always a pure result of institutional level collaboration, sometimes they are built around personal links of organizational leaders/representatives (Balkundi & Kilduff, 2005).

Organization leaders often use their personal social ties to obtain information about external risks and opportunities, to maintain social capital, and to manage resource dependency between organizations (Burt, 1992; Westphal, Boivie, & Ming Chng, 2006). Thus, IORs, unlike individual networks, are in effect multi-level networks, involving the management of both personal and institutional networks. Scholars have also heavily researched the relationship between use of information communication technologies (ICTs) and the creation and maintenance of personal and institutional networks. Many researchers have studied how individuals have utilized ICTs to maintain and build their social networks, often in terms of social capital considerations as well as general considerations about relationships (Haythornthwaite, 2005; Wellman et al., 1996). Communication studies have also attempted to map out the relationship between organizational ICT use as it relates to the creation of IOR based social networks (Doerfel and Haseki, 2013). This study explores the relationship between the utilization of ICTs in building and maintaining interorganizational networks on both institutional and personal levels. Additionally, it will focus on how the use of ICTs affects interorganizational dependence on information, social capital, and other resources.

Poster SAT.PM3

Using a Network Approach to Identify Missed Opportunities in Caregiving Networks

Amanda Ludden, Social Network Methods Section, National Institutes of Health, Sato Ashida, Christopher Marcum, Laura Koehly

Contact: amjludden@gmail.com

Alzheimer's disease and related dementia (ADRD) affects 5.2 million people, with 1% to 5% of cases (52,000–260,000) attributed to genetic factors. These people increasingly receive care from informal caregivers, such as spouses and adult children, as well as from formal, institutional

caregivers. Previous research has generally relied on one caregiver (an index informant) to describe their role and other family caregivers' (alters) roles. This single informant approach may be limited by participant bias and the inability to capture the flow information, such as genetic risk or support resources, which can affect the quality of care provided to patients. Using data from 24 networks of caregivers to ADRD patients, we demonstrate the added value to caregiving research by using a multiple informant social network approach. On average, each additional informant beyond the index added 6.2 new members, resulting in about 10 new members per family network. Among these new members were a significant proportion of people who provide direct care (85% increase) and decision making support (48% increase) to the ADRD patient. In addition to identifying these other integral network members, this approach also allows for the comparison of informants' reports about caregiving contributions. For families affected by conditions like ADRD which have genetic risk factors, the information gained from the multiple informant approach can inform future interventions and facilitate adaptation.

Poster SAT.PM3

"All the cool kids are doing it": A social network analysis on the role of natural peer leaders regarding sexual behavior among adolescents

Helen Mahony, Department of Community and Family Health, College of Public Health, University of South Florida, Eric Buhi, John Skvoretz, Rita DeBate

Contact: hgeorgie@health.usf.edu

Youth who are well-regarded by their peers may serve as natural leaders whose sexual behavior practices can be emulated by those around them. This proposition was assessed using network-level data from the Wave I in-home sample of the National Longitudinal Study of Adolescent Health. Complete network data from two networks with the largest sample size were included in the analysis. Outcomes of interest were ever had sex, method of contraception at recent sex, in-degree measures of popularity, and outcomes of popular youth were compared to their network. Analyses were conducted in SAS version 9.3 and UCINET 6. Results reveal that among youth in network 1 (N=832; mean age 16.39 years), 48% reported ever having had sex, 28% reported not using any contraception at most recent sex, 59% reported that they used condoms, 18% reported using one effective method of contraception, and 9% reported using dual contraceptive methods. Among youth in network 2 (N=1721; mean age 16.77 years), 49% reported ever having had sex, 42% reported not using any contraception at recent sex, 53% reported using condoms, 12% reported using one effective method, and 13% reported using dual methods. Many youth with high in-degree had never had sex and, among those who reported having had sex, the majority did not use any contraceptive method at recent sex. Results indicate that although natural peer leaders may be avenues for promotion of safer sex

practices, further research is needed to determine the role these youth have on the sexual behaviors in their networks.

Poster SAT.PM3

A Protocol for Rapid Appraisal of Community Social Structure

Brian Mayer, University of Arizona, Kyle Puetz, Christopher McCarty, Raffaele Vacca

Contact: brianmayer@email.arizona.edu

Residents of communities recovering from disasters rely on both formal and informal relationships for tangible and emotional support. The composition and structure of these relationships vary from one person to another and may result in different coping strategies. Within a small geographic space, such as a small community or neighborhood, these support personal networks may be part of a larger whole network structure with compositional and structural properties affecting how the personal networks are formed and people access resources. Typically a whole network study would be done by interviewing most, and if possible all, members of the whole network. This is not practical for communities with hundreds or thousands of households. We present an alternative approach where we collect personal network data from key stakeholders in three Gulf Coast communities, asking respondents to list those people they rely on following a disaster. Respondents provide information about each alter and about the ties among alters. We then use a procedure to overlap these personal networks to understand the network structure of the community. We use a sample of respondents to report on the entire community, and identify: (1) Key brokers, (2) Factions or subgroups within the community, (3) Common network resources outside the community. We examine which combinations of personal networks from sub-samples of respondents best represent the characteristics of the whole network. One of our goals is to develop a protocol for a Rapid Appraisal of Community Social Structure that can be generated quickly and with the least respondent burden.

Poster SAT.PM3

Meta-analysis on school level variables in a co-evolving network analyses of adolescent friendship and smoking behaviour.

Helen McAneney, Queen's University Belfast, Gareth Cochrane, Kathryn Higgins, Jim McCann, Frank Kee

Contact: h.mcaneney@qub.ac.uk

Objective: To explore the association of school-level variables on the social network evolution of friendship and behaviours. **Methods:** The data were collected in the Belfast Youth Development Study (BYDS) which commenced in 2001 with participants aged 11/12 years old, from 43 schools, and with approximately 4,300 participants. The initial five waves contained self-complete questionnaire data on lifestyle, substance-use and friendship. Using RSiena, a single model was applied to each school to explore the co-evolution of friendship and smoking behaviour over consecutive waves. Subsequently a meta-regression was conducted on each model parameter on school-level variables (school size, governance, gender composition, free school meals (a proxy for SES), smoking and alcohol prevalence) using the backward selection method. **Results:** Data from 17 schools were analysed and included in the meta-analysis. School size was a significant school-level parameter for the network parameters of outdegree, reciprocity and triadic structures, as might be expected, plus quadratic shape on the behavioural dynamics. School governance remained significant for outdegree, same sex and effect from alcohol, whilst SES only remained significant for the outdegree parameter. Gender composition was significant for the same sex and the linear shape parameter. Smoking and alcohol prevalence levels did remain significant for transitive triplets but with opposite signs and at different periods of the study. Lastly smoking prevalence remained a significant factor in the cigarette alter, similarity and linear shape parameters. **Conclusions:** Analysis illustrates that there are three levels of parameters that can affect network and behaviour evolution: individual, local (friendship) and global (school).

Poster SAT.PM3

Prevalence of HIV-related outcomes among men who have sex with men (MSM) in 3 Indian cities: A comparison of crude estimates and two Respondent-Driven Sampling (RDS) estimators

Allison McFall, Johns Hopkins Bloomberg School of Public Health, Department of Epidemiology, Sunil Solomon, Gregory Lucas, Aylur Srikrishnan, David Celentano, Suniti Solomon, Shruti Mehta

Contact: amcfall@jhsph.edu

Background: Recruiting hard-to-reach populations, including MSM, increasingly involves respondent-driven sampling (RDS), which uses the target population's social network. RDS aims to produce unbiased population estimates. However, to reduce bias, crude estimates are 'weighted,' using one of several different estimators. Few studies have compared the performance of these estimators in different populations. Methods: We used RDS to recruit ~1,000 MSM in each of three cities in India. We compared crude proportions and 95% confidence intervals (CIs) with RDS-I (incorporates network size and recruitment patterns) and RDS-II (incorporates network size only) weighted estimates. Some proportions were estimated on the full sample (e.g., HIV prevalence) and others in the HIV-positive subsample (e.g., awareness of HIV status). Results: Mean network size by city ranged from 21-26 MSM seen in last 30 days (overall range: 0-2000). For nearly all outcomes, network sizes differed significantly across response categories. Across all sites and outcomes, percent change from crude was similar for RDS-I and RDS-II weighted estimates, -23.2% and -26.8%, respectively. However, there was considerable variation in change and in some instances, RDS-I and RDS-II-weighted proportions were qualitatively different from the crude. CIs for both estimators were often 2-3 times as wide as the crude with the largest differences in HIV-positive subgroup estimates. Conclusions: Overall, RDS-I and RDS-II estimators produce similar population proportion estimates and network size largely drives the change from the crude. CIs derived from estimators in the smaller subgroups were especially wide. This imprecision can be problematic when program priorities or interventions are developed based on the estimates.

Poster SAT.PM3

An egocentric social network analysis of substance use comorbidity and homophily

Matthew Meisel, University of Georgia

Contact: mameisel@uga.edu

The current study utilized egocentric social network analysis to examine college students' perceptions of their social networks' substance use. Specifically, we investigated whether

individuals' (termed "egos") perceptions of their friends, family members, and co-workers' ("alters") substance use was a function of egos' substance use. We also examined whether alters who engaged in frequent substance use were more connected to other alters who engaged in frequent substance use (i.e., homophily). The sample consisted of 329 undergraduates at a large American university. In the study, undergraduates enumerated 30 of their closest friends, family members, and co-workers. Participants then reported their perceptions of each alter's frequency of substance use (i.e. drinking, smoking, gambling, and marijuana use), their own substance use, and the relationships (i.e. closeness) among alters. Preliminary results indicated that after controlling for the ego's substance use, alters' gambling, smoking, drinking, and marijuana use were all moderately positively correlated with one another. Second, results found support for substance use homophily, particularly with marijuana and alcohol use. Lastly, we found evidence of comorbidity of substance use in the alters' local environments. Taken together, these results indicate that these addictive behaviors tend to co-occur, and that these individuals are connected to others who engage in similar substance use.

Poster SAT.PM3

Exploring the social-structural position of a new school leader: a case study

Chloé Meredith, Centre for Educational Effectiveness and -Evaluation (KU Leuven), Charlotte Struyve, Sarah Gielen

Contact: chloe.meredith@ppw.kuleuven.be

Within the limited amount of social network research studying school leadership the main focus is on the influence of the school leader's position on the school's functioning (e.g. Friedkin & Slater, 1994; Spillane, 2005; Moolenaar, Slegers, & Daly, 2010). This research often concludes that school leader's legitimacy not simply stems from their hierarchical rank, but rather from the social-structural position they have in organizational social networks (Kilduff & Balkundi, 2006). Limited attention has been paid to the position of new beginning school leaders facing the challenge of socialisation in the school as well as obtaining legitimacy to lead teachers. Based on succession and organizational socialization theory, we investigate the succession of a school leader using a social network approach. The aim of this paper is to explore the social networks of a new school leader and to figure out if this aligns with how this 'newcomer' perceives his social-structural position within and beyond the school. In doing so, a case study of a Flemish secondary school is conducted, using a mixed-method approach in which we combine both quantitative social network data (ego network, the whole school network and the interschool network measures) and interview data comprising the perceptions of the new school leader concerning his/her social-structural position. We conclude with future research plans by elaborating how this study forms a first step of a longitudinal case study in which we conscientiously follow changes in the positioning of this beginning school leader over the years to distinguish different stages and mechanisms in the socialization process.

Poster SAT.PM3

Pathways to health and wellbeing – the social networks of orphaned and abandoned children (OAC)

Lynne Messer, School of Community Health; College of Urban and Public Affairs; Portland State University, Kathryn Whetten, Anna Koons

Contact: lynne.messer@pdx.edu

Background. More than 143 million children (ages 0-17) have been orphaned by the death of one or both parents. These orphans, in addition to the millions abandoned by their parents, are disadvantaged in their educational attainment, employment opportunities and sexual risk. While well-understood that social networks are important during adolescence and early adulthood, how the social networks of OAC contribute to health and HIV-risk trajectories remains unknown. **Methods.** Longitudinal social and sexual network data have been collected from a community-representative sample of approximately 2000 OAC from four countries (Cambodia, Ethiopia, Kenya, Tanzania). Roughly equal proportions of the sample live in family- and institution-based settings. In multilevel linear or logistic fixed slope random intercept models, health and wellbeing outcomes (education participation, employment obtainment and sexual risk-taking) are predicted as a function of social network characteristics. Beta coefficients, odds ratios and 95% confidence intervals are reported. **Results.** Mean age at baseline is 14.1 with approximately 57% of respondents being female. A larger proportion of respondents named multiple alters providing educational support (90%) compared with alters providing employment support (9%). Females reported higher HIV risk behaviors than males at baseline. Network size, strength, type of support provided and alter characteristics varied by residential status (family- versus institution-based). **Discussion.** The long-term goal of this research is to identify key intervenable factors that contribute to OAC disadvantage or resilience, in order to construct viable interventions for promoting OAC health and well-being. The social networks of OAC are a likely intervention-point for remediating the early-life disadvantages experienced by these youth.

Poster SAT.PM3

Ecological network analysis application to energy security

Nga Nguyen, Central European University

Contact: nga.nguyen@mespom.eu

This paper explores the applicability of ecological network analysis to assessing energy security. It analyses data on the national flow of energy (IEA 2010) from primary level (natural gas and

crude oil) to secondary level (product oil, heat and electricity) to tertiary end-users (transportation, industry, public and residential energy sector). It identifies two system indicators analogous to Average Mutual Information and Conditional Uncertainty, and two local indicators, adapting the Trophic Level and the Omnivory Index, as appropriate for national energy security assessment. The system indicators reflect the vulnerability and resilience of national energy systems, respectively, and are easy to compute and interpret. The system indicators do not correlate with the level of economic development but do depend on the geographic location of the country. They also correlate with the widely used measure of energy security: the diversity of energy sources. At the same time they provide more information about potential vulnerabilities of energy systems than merely aggregate diversity. The local indicators potentially reflect the quality of energy consumed at each energy level and the variance in the energy consumption. These two indicators are not independent of each other and do not correlate with existing indicators, thus making interpretation more challenging. The additional information gained from ecological network analysis provides a novel perspective onto energy security both at the national level and the sector level. However, further work is required to make these indicators policy relevant.

Poster SAT.PM3

Overlapping Networks in Sixteen Vietnamese Villages

Colin Odden, Department of Sociology Ohio State University

Contact: odden.2@osu.edu

Using recently-collected data from the Television and International Family Change study, this work illustrates the structure of exchange (gifts and loans), cooperation (work, worship and care) and advice (health and family planning) networks among Thai minorities in sixteen rural and isolated Vietnamese villages. Ego-network analyses explore demographic, ideational and linguistic correlates of network composition, as well as the distinction between kin and non-kin, and neighbor / non-neighbor, networks. Opinion leadership and "marginal" influencers are identified to anticipate effective public health interventions.

Poster SAT.PM3

Specialty and Physician Referral Network

Talha Oz, George Mason University, Janusz Wojtusiak

Contact: toz@gmu.edu

Examining the referral relationship between specialties and physicians may help improving the healthcare workflows in many ways. Studying referrals at a larger scale reveals not only the patterns but also the anomalies that help to identify specific conditions that may also require further investigations. This study examines the referral patterns among specialties and physicians using social network analysis and provides visualizations of the findings to facilitate the network perception. Analysis is performed at several scales that can be summed up under two categories: physician level and specialty level. The analyzed dataset consists of about 25 million records in which referrer and performer physician IDs are available and are not the same (the study excludes self-referrals). At physician level, referral metrics are calculated individually and physicians who significantly deviate from the mean network metric values are flagged for further investigation. Weighted directed graphs of specialties are also generated by grouping the doctors in the same specialty to a single vertex and aggregating the edges (i.e. referrals) between the physicians by their specialties. Both physician and specialty referral patterns are compared at various scales like zip code areas, county wise and at state level. This study is based on the SEER-Medicare database consisting of the National Claims History (NCH) records collected by the Center for Medicare & Medicaid Services (CMS) and provided by the Surveillance, Epidemiology, and End Results (SEER) program of the National Cancer Institute.

Poster SAT.PM3

PATNET Exploring Social Media for improved Learning, Healthcare Management and Intervention in Patient groups in Ireland

Diane Payne, UCD Dynamics Lab Geary Institute University College Dublin, Nasim Mahmud

Contact: diane.payne@ucd.ie

There is relatively little systematic research to date on the use and impact of social media in healthcare management, how health care professional and patients behave through interaction in social media forums and how these new lateral forms of information diffusion impact on individual healthcare practitioner learning and decision making. This research project maps the network structure and actor attributes over time of one or more selected on-line patient groups. Second, it develops cross-sectional and longitudinal network models to explore the importance of individual behavioural attributes and network structures for different type of information

diffusion and learning behaviours across patients and professionals via the social media use. It aims to study the impact of social media on the adoption rate (innovation) of a new “treatment” (e.g medication, therapy, etc) in the patient group over time.

Poster SAT.PM3

Effects of ego network structure and peer influence on suicide risk in the Sources of Strength suicide prevention program

Trevor Pickering, University of Southern California, Peter Wyman, Thomas Valente, Charles Brown

Contact: tpickeri@usc.edu

The CDC has highlighted the promotion of social connectedness as a strategic direction for adolescent suicide prevention. Suicidal adolescents typically report fewer positive relationships to peers, but the effect of the ego's network structure on non-lethal suicide behavior remains largely unknown. Baseline surveys were used from 7,898 students at 30 schools participating in an RCT (Sources of Strength). Participants responded to questions about friendship ties, their suicidality (contemplation, attempt without and with injury) and maladaptive behaviors (rejection of help-seeking, maladaptive coping, and suicide acceptance). Ego's network structure was measured by the number of closed and open ego-centered triads among ego's nominees. Random-effects logistic regression models adjusted for age, in-degree, and out-degree. The number of closed triads in the ego's network was associated with suicide contemplation ($OR=0.96$, $p<.001$). Both closed and open triads were associated with suicide attempt without injury for females ($OR=0.91$ and 1.08 respectively, $p's<.001$) but not for males. Both closed and open triads were associated with suicide attempt with injury for both genders ($OR=0.83$ and 1.08 respectively, $p's<.001$). For each maladaptive behavior, number of friends with that behavior was associated with all suicide outcomes (ORs ranged from 1.14 to 1.32 for any suicide outcome, $p's<.001$) beyond the ego's own maladaptive behavior (ORs ranged from 2.13 to 5.56 for any suicide outcome, $p's<.001$). These results align with theory that structural imbalance within an ego's network creates distress and increases risk for suicidal behavior. A network of well-connected friends is generally protective for suicide outcomes, but there may be a negative peer influence effect when friends reject help-seeking, have maladaptive coping, or view suicide as an acceptable response to distress.

Poster SAT.PM3

Patterns of Networks of the Major Global Retailers

Abhijit Roy, University of Scranton

Contact: roya2@scranton.edu

Based on the latest data from 2011 on the top 250 major global retailers by Deliotte and Stores magazine, we try to investigate their network patterns. What formats of retailing (hypermarkets, supermarkets, discount stores, cash and carry warehouse club, department store, drug store/pharmacy, etc.) are popular in different regions of the world? How global are the major retailers, and how geographically concentrated are they? We also demonstrate some two mode networks (retailers X country of operation, retailers X store formats, country of origin of retailer X country operated in). Using network multiplication different interesting derived networks are obtained. We show the incidence of a “domino effect,” in other words, how a retailers entry into one country predicts the entry into a neighboring country. Similar analysis is performed for data from a decade ago (from 2001), and compared with the results for the data from 2011. Implications for global retailing strategies are also discussed.

Poster SAT.PM3

A Network Analysis of International Internet Backbone Ownership

Jeanette Ruiz, UC Davis, George Barnett

Contact: jbruiz@ucdavis.edu

This research examines who control the international Internet using a multi-level network analysis. Internet provider (IP) address ownership data obtained from TeleGeography (<http://www.telegeography.com/>) are used to describe the structure of the international network of private companies and Internet service providers (ISPs). The data collection process resulted in a two-mode network (company [113] by country [191]), with each cell indicating the bandwidth capacity of each country held by individual companies and Internet service providers (ISP's). The network was analyzed at corporate and national levels. Results indicate that 16 companies, headquartered in seven countries, are at the center of a sparse network, each accounting for more than one percent of international Internet connections. Together, they account for over a 90% share of the links. Level 3 Communications, based in the United States, is at the center of the network, followed by Century Link (U. S.), Telia Sonera (Sweden), AT&T (U. S.), Cogent Communications (U. S.), Verizon Business (U. S.), XO Communications (U. S.), Hurricane Electric (U. S.), Tata Communications (India), and NTT Communications (Japan). The United States is the most central nation in the ownership network. American corporations

account for almost 40% of the international links, followed by Sweden (16%), China (10%), Japan (10%), and Italy and India (7%). A cluster analysis found a single group centered about the United States. The ownership network is consistent with other measures of the international Internet network. Its structure replicates and maintains the global hierarchy as suggested by world system and globalization theory.

Poster SAT.PM3

Comparing the Physical Activity Support Networks of Physically Active and Sedentary African American Women

Brit Saksvig, University of Maryland School of Public Health, Ashley Woodall, Togtong Wu, Deborah Young

Contact: bsaksvig@umd.edu

Health inequality remains disproportionately high for African American women. Almost 20% of African American women living in Maryland and Washington, DC are completely sedentary. Previous studies have found support from friends and family facilitates physical activity (PA) in African American women. Our data indicate that a higher baseline level of social support predicted an increase in PA. The Sisters Healthy and Physically Empowered (SHAPE) study was designed to gain a better understanding of the structure and influence of the PA support networks of African American women. In winter/spring 2014 we will recruit 200 African American women to complete a questionnaire to assess usual PA and other factors related to PA. Of the 200 participants, 50 women who are physically active and sedentary and represent both young and older age groups will then be selected to participate in an in-depth eco-mapping interview to describe their PA networks including types and frequency of support provided, PA level of their network, and types of physical activities they do together. Participants will also wear an accelerometer for 7 days. We will describe the PA support networks of participants and compare the networks of participants who are more active to ones who are less active, as well as participants who are younger compared to older participants. We will also explore the relationship between the participant's PA level and that of her network. Results from this study will be used to design a social network based PA intervention for African American women.

Poster SAT.PM3

Network Analysis of Private Water Companies: Collaboration and Competition

Yasaman Sarabi, University of Greenwich, London

Contact: sy10@gre.ac.uk

This work looks into debates about water privatisation from a new perspective, business networks framework. From an inter-organisational viewpoint, each private water company consists of a considerable network of subsidiaries scattered globally operating under the parent company's supervision. Two French private multi-national companies, Veolia Environnement and Suez Environnement, which provide environmental services including water and sanitary services, are the focus of this study. A large dataset has been compiled for the purpose of this work using detailed information available on the structure and operation of these two companies from various sources. With the help of network analysis tools, it has been tried to identify the on-going collaboration and competition between these companies; concentrating on their location decisions based on geographical positions of the subsidiaries and similarities within their management configurations.

Poster SAT.PM3

Influence and Selection in Longitudinal Bipartite Policy Networks

John Scott, University of North Carolina at Chapel Hill

Contact: jcscott@email.unc.edu

In political and policy studies, many long-standing questions are being re-examined in light of new data and methods. In particular, social network methods can address important and long-standing questions, include the following: How are lobbying agendas formed? Do lobbyists influence each other when selecting some legislative issues over others? While individual preferences matter, a social process may also affect why lobbyists choose legislation on which to lobby. In a crowded environment, looking at what credible others do may help a lobbyist lower their search and information costs about an issue. Using longitudinal bipartite network data on lobbyists' legislative choices in two U.S. policy domains – Medicare/Medicaid and retirement policy – I analyze the choices of organizations using an actor-based dynamic model of network change that conditions agenda changes on the choices made by other organizations. The networks consist of one mode of lobbyists and their clients and the other mode being proposed legislation. In both policy areas, a 'bandwagon' process in which organizations converge on 'popular' bills and an influence process in which lobbying organization influence each other when their lobbying agendas overlap. But effects also differ across the policy areas such as the

presence of high 'activity' organizations in the Medicare policy area. Interpreting the quantitative findings, anecdotal and qualitative information provide the insight that the policy domain can be either a social community or a fragmented and fluid environment.

Poster SAT.PM3

An Investigation of the Definition and Consequences of Difficult Coworkers

Deborah Searcy, Florida Atlantic University, Cynthia Stevens

Contact: dsearcy@fau.edu

Although the topic of difficult coworkers is popular in the business press, empirical work in this area has been fragmented across a variety of dysfunctional workplace behaviors (e.g., incivility) and types of problematic colleagues (e.g., abusive supervisors). To address this, we conducted a two-phase study. In study one, using a grounded theory methodology, we interviewed 46 working adults about their experiences with difficult coworkers. Analysis yielded the following definition: difficult coworkers are those (a) with whom one comes into regular contact in the workplace; (b) about whom there is some consensus among others that the person creates problems at work, because (c) they have a detrimental impact on one's own or one's unit's performance, and (d) they repeatedly violate normative standards of workplace behavior. In study two, using both grounded theory and social network analysis, we interviewed all 14 employees of a single, small firm; the firm had had a difficult employee who voluntarily left during the prior 2 weeks. We sought to further understand the impact of a single individual as a chronic difficult coworker, and to better track the degree of consensus among coworkers. Understanding the role of consensus is important in the theoretical development of our model, which proposes that difficult colleagues represent a multi-level phenomenon. We sought to create a unifying framework that will enable researchers to explain precisely how difficult colleagues impair workplace functioning.

Poster SAT.PM3

Application of social network analysis to the reorganization of study groups

Aleksandr Semenov, , Aleksandr Pronin, Elena Veretyonnik

Contact: semenoffalex@gmail.com

This paper presents results of preliminary analysis of an application of social network analysis to a reorganization of student study groups in St. Petersburg's campus of National Research University Higher School of Economics. We used data from sociometric survey to develop and implement an approach for reorganization of student groups which allow preserving their

friendship, communication, support and other kind of ties for optimal learning experience in the new groups. The sociometric questionnaire contained 5 questions on communication, trust, information, advice and improvement networks. First two questions were group level, while the other three – faculty level. We performed a clustering on faculty level networks to create “cores” for the new groups, while using group level networks for final arrangement of students in equally-sized groups. After 1,5 years we compared student performance (average score and position in faculty rating) in these groups with other faculty’s groups, which were reorganized on standard basis. The results were surprising and non-trivial: although students in sociometry-based groups demonstrated greater increase of the average score, it was non-linear and dropped from 57% after the 1st semester to 37% in the 2nd and up to 42% after one year. Moreover, the proportion of students, who have risen in the rating almost doubled between 1st and 2nd semesters (from 35% to 68%) and dropped to 52% after a year. Such outcomes suggest that our results demand further analysis before our method can be suggested for implementation in the University’s practice.

Poster SAT.PM3

German Federal Association of Local Health Insurance funds (‘AOK’) and their publishing agency ‘KomPart’: a value-oriented internal communication network

Tobias Stähler, SRH Hochschule Berlin, Ian Towers, Anabel Ternès

Contact: tobias.staehler@srh-hochschule-berlin.de

Within German Health Care Industry, the statutory health insurance system offers a continuous flow of services for about 70 million people – approximately a third of them insured with the Federal Association of Local Health Insurance Funds (AOK), a network of eleven regional organizations with about 53.900 employees and a Berlin-based head organization (AOK Bundesverband). Here, efficient internal communication proves a formidable challenge, met by the Bundesverband’s ‘next door’-partnership with KomPart publishing agency, which in turn produces most of the media content for the regional AOKs. AOK’s behavioral branding docks at a set of formalized values answering the question as to how employees are being encouraged to deliver a clear brand image. This may be interpreted as a practical way of raising the acceptance, attractiveness – and thereby the controlling power of corporate communication. Thus, this paper proposes a sociology-driven understanding of shared social ‘values’ associated with norms, reflexivity and control. Furthermore it suggests that fruitful internal communication in this branch – that has just recently started its discourse on organizational values – can only be achieved by an intertwined network. Qualitative guideline interviewing among AOK’s and KomPart’s intermediate level of management dealing with value-oriented internal communication as well as a paper-based diagram on the intersection network of both firms are chosen as empirical tools. Because of the transversal nature of value traits among

corporate communication processes, the network view is limited to covering all relevant projects in 2013, most importantly a jubilee-magazine celebrating the 25th anniversary of AOK.

Poster SAT.PM3

On the distinctive features of the discourse on climate change in the blogosphere

Lubos Steskal, University of Bergen, Dag Elgesem

Contact: lubos.steskal@uib.no

We analyze an extensive corpus of climate change blogs to identify the textual features that drive the creation of community structure in the hyperlink-induced blog network. We use the Latent Dirichlet Allocation (LDA) method to derive a topic structure of the textual corpus and modularity maximization to extract the underlying network community structure. We then run a sentiment analysis of the texts and also manually classify a substantial part of the blogs as climate skeptics, climate acceptors, and neutral. The sentiment score and topic structure are then successfully used as features in classifiers for community membership and the position in the climate change debate. We further identify the features that are most relevant for these classifications.

Poster SAT.PM3

Academic Gatekeeping: An analysis of formal roles of production within a field

Scott Thomas, Claremont Graduate University, Manuel Gonzalez Canche

Contact: scott.thomas@cgu.edu

We examine the emergence and decline of gatekeepers in an academic field (higher education) by constructing the networks on editorial boards of the field's leading journals and several disciplinary journals that are recognized as making important contributions to this field. These networks are examined over a 20 year period and supplemented with data on network members' doctoral alma maters, their current institution of employment, rank, and a crude field impact score. We also incorporate data on professional association leadership roles across the period. This secondary information is used to establish precursor networks that emerge from the graduate programs feeding talent to the field under examination. This allows us to identify the key gateways through which subsequent leadership emerges. Publishing in these journals and appearing on the programs' meetings of these professional associations are key elements to promotion and tenure in this field. Accordingly, the leadership positions in these boards and in these organizations importantly shape both scholars' careers and the vitality of the field. Our results show that a small handful of graduate programs provide disproportionate access to

these key gatekeeping positions (as measured by betweenness centrality) in the field and that there is only minor deviation from this pattern across the period we examine.

Poster SAT.PM3

Collecting Ego Network Data with Visual Tools – A Comparative Study

Tom Toepfer, University of Hamburg, Betina Hollstein, Dagmar Zanker, Juergen Pfeffer

Contact: tom.toepfer@wiso.uni-hamburg.de

Collecting data on personal networks is a complex process with diverse cognitive challenges both for interviewers and for interviewees. In the last decades a variety of instruments using visualization to collect ego networks emerged which differ in degree of standardization, structuration and stimuli. Comparing different visualization instruments like concentric circles (e.g. Kahn/Antonucci 1980 and modifications), the funnel tool (Hollstein et al. 2013) and free designs we explore advantages and drawbacks of the different instruments concerning: a) the reactivity of the instruments, b) the usability for interviewees, c) the validity of data, and d) instructions and stimuli. Targeting the potential of different visual tools, we conduct a study using the thinking aloud method. To get access to cognitive processes of the interviewees, participants are asked to verbalize their associations and thoughts during the process of network data collection. Based on these recorded verbal data we analyze the potential and impacts of the selected tools for integration into a network survey. Using a purposeful sampling we systematically vary characteristics of the participants, like gender, age, socioeconomic status and cultural background. In this poster presentation we describe the research design and possibilities of collecting ego network data with visual tools and present first results of the comparative study.

Poster SAT.PM3

Friendship networks of adolescents with ADHD

Barbara Wise, Ohio State University, Jodi Ford

Contact: wise.1043@buckeyemail.osu.edu

Abstract Background: Peer problems have been demonstrated repeatedly among children with ADHD, but the literature is conflicting regarding the peer relations of adolescents with ADHD, and their friendship networks have not been described. The purpose of this study is to compare the friendship networks of adolescents with ADHD to those without ADHD. Methods: Secondary analysis of the school network data from the National Longitudinal Study of Adolescent Health, a nationally representative sample of 7th through 12th graders, will be

conducted on a sample of 2768 adolescents. Adolescents with ADHD symptoms in childhood were identified by retrospective self-report in wave III. Traditional friendship network measures and perceptions of social acceptance will be examined. Results and Hypotheses: Approximately 10% of the adolescents in the sample reported ADHD symptoms in childhood. Social network analyses are underway. Hypotheses to be tested include: (1) Adolescents with ADHD will report lower social acceptance compared to adolescents without ADHD. (2) The friendship networks of adolescents with ADHD will be characterized by fewer total ties and incoming ties, a lower presence of one mutual same gender friend, lower centrality, reach, and proximity prestige, a higher percentage of isolates and pendants, lower strength of ties, and more heterogeneous networks compared to adolescents without ADHD. Conclusions: The findings will elucidate differences and similarities in the friendship networks of adolescents with ADHD and those without to guide future research and intervention development.

Poster SAT.PM3

Idea generation dynamics in an emergent social network

Marino Zelst, Tilburg University Department of Organization Studies, Linda Dominguez Alvarez

Contact: j.m.vanzelst@tilburguniversity.edu

Although ideas are generated by the individual, the development of ideas in teams is usually guided by some social process of discussion. Some ideas are discarded while others are promoted as the 'right' idea by other members of the group. In this paper, we investigate and explore whether we are able to foresee whether divergence and convergence in idea generation can be predicted from individual characteristics and the development of an emergent network. We analyze four teams in an exploratory way, by studying the developing network through relational questionnaires and analyzing videos of team meetings. We are able to track the communication patterns of an emergent team via the meetings outside the team (via the questionnaires) and the communication during the meetings via the videos. A critical event perspective is used to look at the divergence and convergence of proposed ideas.

Inter-Organizational Networks SUN.AM1

Inter-Organizational Networks SUN.AM1

Bureaucratic Power Structure in a Transitional Economy: Social Network Analysis of Inter-bureau Personnel Flow in China

Song Yang, University of Arkansas

Contact: bobscholar@gmail.com

Studies of bureaucratic structure in Chinese nation state have been limited due to anecdotal evidences. This study represents the first systematic investigation using social network analysis to examine a dataset of large scale multi-year cadre movements between Chinese bureaus. In particular, we investigate the lateral classification and hierarchical ranking among 83 long standing Chinese bureaus. Empirical findings suggest that Chinese bureaus do not always adhere with each other based on their functional areas – different types of bureaus mingle and band with each other, creating mixed clusters. However, those mixed clusters tend to over-represent one type of bureau, under-representing other types. Our hierarchical analysis shows that the coalition that is dominated by the Chinese Communist Party appears to be the most central one, which affirms the iron hand of the Communist party in its political regime and their leadership in various activities, including economic reform and development.

Inter-Organizational Networks SUN.AM1

Identity, sector, and community detection in unstructured affiliation data

David Lazer, Northeastern University, Navid Dianati, Guy Lifshitz, Derek Ruths

Contact: davelazer@gmail.com

We propose using community detection algorithms to (1) disambiguate affiliations, and (2) to identify systemic substructures within unstructured affiliation data. We utilize Federal Election Commission (FEC) data, in which contributors to campaigns are required to identify their employer. Because there is no standard identifier for employers – this is an unstructured textual field in the reporting form – the association of multiple employers with a given individual could either be indicative of multiple signifiers for the same employer, or the movement of that individual among employers. Here we adapt community detection based methods to separate these two mechanisms. These findings both have important application in the analysis of FEC data, and generalizability to any affiliation data which are unstructured and there are repeat observations for individuals over time.

Inter-Organizational Networks SUN.AM1

Is greed good? An ecological analysis of organizational membership

Yongren Shi, Cornell University, Matthew Brashears, Michael Genkin

Contact: ys334@cornell.edu

How do organizations sustain a stable group of members in a world full of competing obligations and opportunities? Lewis Coser (1974) provided an answer to this question by arguing that organizations deploy “greedy” mechanisms to weaken or even cut off ties with institutions or persons that might demand time and energy from members. While monopolizing the social networks of members shields them from competing claims from outside, it also suppresses the opportunity to recruit new members. We use McPherson’s ecological affiliation (1983) model to explore the dynamics of organizational membership as a competition process among organizations for scarce resource of human time. Diverging from this approach, we examine two strategies that organizations employ to harness membership resources, demand of time and energy and the rewiring of social networks. Both strategies can predict either growth or decline in membership size. Social ties play a double role in both keeping organizations from losing members and helping membership growth. And surge in time demand would press members to leave organizations because they have to balance claims from family, schools, jobs, religions and other organizations, while members will not fully commit themselves in lenient organizations. In an agent based model, we model human time as limited slots allocated to organizational demands as well as other activities and model membership transmission in an urn-based influence model. Contrary to Coser’s theory of greedy institutions, we identify the median demanding spots in strategy space where organizations grows most quickly in membership size.

Inter-Organizational Networks SUN.AM1

Network Structure, Multiplexity, and Evolution as Influences on Community-Based Participatory Interventions

Rong Wang, University of Southern California, Sora Tanjasiri, Paula Palmer, Thomas Valente

Contact: rongw@usc.edu

As community-based participatory research (CBPR) is gaining legitimacy in academia, scholars have yet to systematically evaluate the sustainability of the partnerships and factors that influence CBPR outcomes. This study takes a community ecological perspective to examine how CBPR partnerships evolve to reduce health disparities. We analyze two waves of survey data

collected from partners involved in the Weaving an Islander Network for Cancer Awareness Research and Training (WINCART) initiative, which was designed to reduce cancer disparities among Pacific Islanders in Southern California. Preliminary analysis showed that transitivity and organizational homophily drove the evolution of the communication networks. The connectivity of the communication network increased over time while its centralization decreased. Further analysis focused on the role of resources in the alliances between community-based organizations (CBOs) and universities and how communication, formal agreements, and client referral networks co-evolve with CBPR partners' activities in education, outreach, training, advocacy and research. Implications of this study challenge the traditional resource-oriented understanding of cross-sector alliances. This study also contributes to the literature on the dynamics of multiplex ties and Community Based Participatory Research.

Inter-Organizational Networks SUN.AM1

Social Structure and Competition in Interhospital Patient Handoff Relations

Francesca Pallotti, University of Greenwich (UK) and Università della svizzeraitaliana (Switzerland), Alessandro Lomi, Duy Vu, Daniele Mascia

Contact: f.pallotti@gre.ac.uk

We examine sequences of patient transfer episodes (patient handoffs) between hospitals as signals of collaboration requiring a high level of coordination across organizational boundaries. We distinguish between interhospital patient transfer events across different clinical specialties, and within the same specialties. Building on absorptive capacity arguments we argue that interhospital patient transfer relations involve a lower level of uncertainty about the quality of partners when patients are transferred within the same clinical specialty, rather than between different clinical specialties. This is particularly the case when the receiving hospital has clinical competencies that the sending hospital is lacking. We predict that social structure and competition will affect differently the dynamics of interhospital collaboration depending on the specific kind of patient handoff relation linking partner hospitals. We specify and estimate newly derived stochastic models for relational event sequences. We find that patient handoff events are more likely to be observed between competing hospitals when patients are being transferred across different clinical specialties. However, we also find that competition has no effect on patient handoff events when patients are being transferred within the same clinical specialty. We find that patient handoff events are more likely to be observed between hospitals sharing multiple partners when patients are being transferred across different clinical specialties. However, the presence of multiple shared partners has no effect on patient handoff events when patients are being transferred between hospitals but within the same clinical specialty. The overall picture emerging from the empirical results of the study suggests a coexistence of different logics of partner selection underlying interorganizational networks.

Multidisciplinary Perspectives on RDS Inference SUN.AM1

Multidisciplinary Perspectives on RDS Inference SUN.AM1

Comparing geographic coverage and spatial dependence of drug users recruited through Respondent-driven sampling and targeted street outreach

Abby Rudolph, Pacific Institute for Research and Evaluation

Contact: abby.rudolph@gmail.com

Purpose: To compare the geographic coverage and spatial dependence of drug users recruited through Respondent-driven sampling (RDS) and targeted street outreach (TSO). **Methods:** Heroin, crack, and cocaine users aged 18-40 were recruited through TSO (N=217) and RDS (N=403) in New York City (2006-2009). Using the Google Maps API, we calculated metro travel distances (MTDs) in minutes and miles between each participant and the research office and between RDS recruiter-recruit pairs. To assess RDS and TSO spatial dependence, we estimated K-functions (measures the expected number of events within a range of distances from observed events) for each. To examine differences in the extent and resolution of spatial clustering of RDS and TSO participants, we calculated the difference in the K-functions for a range of distances. The null distribution and corresponding 95% CIs were derived through 1,000 Monte Carlo simulations which randomly permuted RDS/TSO location labels. **Results:** The median MTD to the research office was 4.8 minutes (1.1 miles) for RDS participants and 8.7 minutes (2.9 miles) for TSO participants ($p < 0.0001$). The median MTD between RDS recruiter-recruit pairs was 7.6 minutes (2.1 miles). Spatial dependence was observed in each, but was significantly greater for the respondent-driven sample ($p < 0.0001$). **Conclusion:** While neither strategy recruited participants located ≥ 40 minutes (22 miles) by metro from the research office, TSO outperformed RDS with respect to geographic reach and spatial dependence. Future studies should examine geographic patterns in recruitment and determine how the preferential recruitment of more proximal peers could influence the precision and accuracy of RDS estimates.

Multidisciplinary Perspectives on RDS Inference SUN.AM1

RDS and HIV: Rates, Risk Factors and Future Intervention

Benjamin Crosier, University of Florida, Theodorus Sandfort

Contact: bencrosier@gmail.com

Respondent Driven Sampling (RDS) was used to recruit a sample (N = 480) of men who have sex with men (MSM) in South African townships in Tshwane. MSM face increased HIV-related risk factors in these locations due to lacking education, resources and support. This circumstance is further exacerbated by discrimination. These data are used to explore the structural correlates of HIV status, sexual preferences and other related risk factors. 36% of the sample was HIV positive, despite the fact that 95% did not know their status. Structural blockmodeling indicates the presence of assortative mixing regarding HIV status. The fact that such a small proportion of men did not know their status suggests serosorting alone cannot account for these differences. Further, townships display varying degrees of risk and interaction. Possible causes for this are covered. These data have implications for designing future studies and applications, specifically concerning the use snowball sampling and the identification of possible intervention targets that can be selected to deliver behavioral interventions. Finally, in light of some difficulties surrounding traditional data collection techniques, a new data collection tool called Connector will be presented that aims to address some of the hurdles faced by scientists in the field.

Multidisciplinary Perspectives on RDS Inference SUN.AM1

An ethnographic exploration of RDS coupon distribution dynamics- motivations, constraints and contextual factors.

Gayatri Moorthi, The Institute for Community Research, Jianghong Li, Heather Mosher, Margaret Weeks

Contact: gayatri.moorthi@gmail.com

Respondentdriven sampling (RDS) is a widely used method to reach hidden populations,which involves a peer-to-peer recruitment process. Despite its widespread use,little is known about the real-world factors that influence peer recruitmentdynamics. In this paper we qualitatively illustrate peer recruitment intentions,the prioritizing decision making process and street dynamics around coupongiving. Out of 500 participants in our mixed-method study, 60 were recruitedfor an in-depth interview to explore their recruitment decisions. We alsoconducted ethnographic observation over the course of a year in Hartford, CT, tobetter understand the context of recruitment. Thematic analysis of in-depthinterviews and ethnographic observation

suggests that multiple interrelated factors work together to shape the recruitment process that influences who the participant actually recruits for the study. Factors such as the relationship between a recruiter and potential alter, the reliability of the alter to participate in the survey, prior favor exchange or financial obligations, the convenience of finding alters and the proximity to the recruiter all acted as crucial reasons for recruiting. However there were considerable differences between the list of potential alters and alters who actually received the coupon and came for the study. Coupon passing was affected by reasons such as unavailability of intended alter, prior participation in the study by the potential alter or refusal or reluctance to participate. This paper, will describe the social, economic, relational, and environmental context that influenced the success of coupon passing. The findings will have implications for quantitative measures regarding peer recruitment process that are essential to RDS methodology development.

Multidisciplinary Perspectives on RDS Inference SUN.AM1

Adapting RDS to Big Data: Known Dependent Sampling in Online Recommender Data

Nathaniel Porter, Penn State University>, Muhammed Idris

Contact: ndp135@psu.edu

Respondent driven sampling has been a boon to those wishing to collect representative samples from hidden populations of people, but has rarely been applied to the scraping of web data. With proper adjustments for known non-random initial selection and tie selection, RDS can help estimate the robustness of network measures of recommender networks. I demonstrate the new approach with book recommendation networks seeded with bestseller lists collected from Amazon.com daily bestsellers in Religion and Spirituality, and show that network data both produces results with face validity on measures of centrality (degree, eigenvector, closeness, betweenness) and unique non-intuitive findings regarding bridging ties between topics and subgroups.

Multidisciplinary Perspectives on RDS Inference SUN.AM1

Assessing differences in groups randomized by recruitment chain in a respondent-driven sample of Seattle-area injection drug users

Richard Burt, Public Health Seattle & King County

Contact: richard.burt@kingcounty.gov

Background: Respondent-driven sampling (RDS) is a form of peer-driven study recruitment and analysis that incorporates features designed to limit and adjust for biases in traditional snowball sampling. Because RDS is being widely used in studies of hidden populations of public health interest, empirical evaluation of its consistency and variability is important.

Methods: We randomized recruitment chains from the RDS-based 2012 National HIV Behavioral Surveillance survey of Seattle-area injection drug users into two groups. We then compared the groups by sociodemographic characteristics, drug-associated risk behavior, sexual risk behavior, HIV status and testing frequency in five different randomizations. This allowed for comparison of groups recruited contemporaneously, by identical methods and using identical survey instruments. **Results:** In the first randomization, based on a p-value of $\leq .001$ in RDS-weighted univariate logistic regression analysis, the two groups differed in 5 of the 18 variables examined: race (60% White vs. 47%), gender (52% male vs. 67%), area of residence (32% downtown vs. 44%), reporting an HIV test in the previous 12 months (51% vs. 38%), and serologic HIV status (4% positive vs. 18%). In the other 4 randomizations differences in one to five variables attained this level of significance, though the specific variables varied among the randomizations. **Conclusions:** Our findings suggest material differences between groups based on randomized recruitment chains within our RDS sample. While the variability of the present study was less than previously reported between serial RDS surveys, enough difference was seen to indicate caution in the interpretation of RDS results.

Social Capital SUN.AM1

Social Capital SUN.AM1

Does social capital make a difference in CSR performance?: A cross-national network study of the Global Fortune 500 corporations

Rong Wang, University of Southern California, Kristen Guth, Wenlin Liu, Kristen Steves, Aimei Yang

Contact: rongw@usc.edu

Corporate social responsibility (CSR) has become an integral part of business practice across countries. As an important component of CSR, cross-sector alliances help organizations to obtain organizational advantages and pool resources (Shumate & O'Connor, 2010; Taylor & Scharlin, 2004). However, limited literature has explored the impacts of international cross-sector alliances on corporations' CSR performance. Drawing upon theories of community ecology (Astley, 1985) and social capital (Lin, 1999; 2005), this study examines the strategic value and impact of international cross-sector alliances on CSR performance. A community ecology view of inter-organizational networks suggests that cross-sector alliances are different from the relationships between organizations in the same population, as cross-sector alliances are built upon a mutual dependence between dissimilar populations. This study proposes that social capital in inter-organizational networks affects the ability of organizations to mobilize resources and improve CSR performance in an organizational community (Aldrich & Ruef, 2006). Social capital is defined as embedded network resources that can be accessed and mobilized through inter-organizational ties (Lin, 1999; Doerfel et al., 2010). The hyperlink networks of Global Fortune 500 corporations and 411 environmental NGOs are analyzed in this study. Within-sector and cross-sector social capital is measured by network structures, such as network closure and brokerage. Corporations' CSR performance is measured by international CSR rankings, donations and positive media coverage. Regression analysis is used for hypotheses testing. The results of this study will inform studies of corporate engagement in strategic alliances with NGOs to achieve higher levels of social capital and CSR performance.

Social Capital SUN.AM1

Guanxi Capital and Corporate Performance in China: Preliminary Results

Yanjie Bian, University of Minnesota

Contact: bianx001@umn.edu

This paper presents a series of statistical tests of the hypothesis that guanxi-based corporate social capital improves organizational performance in an increasingly marketized Chinese economy. In our conceptualization, we consider guanxi-based corporate social capital as being formed by relational particularism and containing multiplex functions and strong reciprocal obligations between the connected parties. In an ongoing analysis of a 2003 survey of 830 firms sampled in China's Pearl River Delta region, we measure organizational performance in terms of employment size, fixed assets, electricity spending, and total revenue. We find that each of these performance measures is positively related to the corporate social capital that has been developed and accumulated through guanxi connections between the surveyed organizations and their business alters. More specifically, the measures of organizational performance tend to increase in magnitude when the organizations are connected to their business alters (1) through ties of particularism (kin and friends) rather than through straight business ties, (2) through multiplex ties (ties that involve multiple channels or functions) rather than through simplex ties, and (3) through ties of stronger, rather than weaker, mutual obligations between them. These tendencies are observed even after variables of organizational structures and corporate governance are being included in the estimated models. The current analytic effort is given to assess the extent to which the effects of guanxi-based corporate social capital on performance are conditioned by business contexts in which organizations operate, market position of the organizations, and cultural values of organizational leaders.

Social Capital SUN.AM1

The influence of social capital on information diffusion in Twitter's interest-based social networks.

Thomas Plotkowiak, University of Zürich

Contact: t.plotkowiak@ipmz.uzh.ch

Recent years have seen an increase in the use of interest-based social networks such as Pinterest, ChimeIn and Twitter. While classic online social networks like Facebook or LinkedIn offer a social utility that deepens social connectivity with our existing social graphs, in interest-based social networks people form social ties based on their interest with people that they don't already know. The information diffusion in such interest-based social networks has only

been marginally researched. Twitter offers a promising natural laboratory to study such networks, because the social ties, interactions and exchanged information in this network are public. This offers the possibility to study the influence of social ties and thematic interest on information diffusion in such interest-based communities. In this work, the theory of social capital was employed to study this subject. The theory of social capital explains why individuals receive retweets in networks as a result of their social ties. The operationalization of the social capital concept for Twitter uses the publicly available data traces of Twitter users. Social ties express the structural and relational dimension of social capital, whereas the interest of a user expresses his cognitive dimension. By studying the retweet traces in 166 interest-based networks, this study finds that in Twitter the structural and cognitive dimension of social capital positively influence information diffusion. This influence has been studied on an individual and group level for bonding and bridging social capital resulting in four perspectives on the phenomenon. The study of the influence of individual bonding social capital on information diffusion shows that highly central individuals who share a group's interests receive more retweets from members of their own interest group. Individuals that build up a high individual bridging social capital by positioning themselves structurally between interest groups and who express a high number of different interests, receive a high number of retweets from members of other interest groups than their own. In the group bonding social capital perspective the work shows that the internal group structure in terms of clustering, density and short paths between the actors of the group positively influences the information exchange among group members. However, a high reciprocity of social ties does not positively influence information exchange between group members. Interest groups that are located in the center of the Twitter ecosystem and whose members have a high number of diverse interests possess a high group bridging social capital. This helps them obtain many retweets from other groups. Studying the interdependencies between bonding and bridging social capital showed that when groups primarily build up group bonding social capital, they decrease their chances of receiving retweets from other groups. However, groups that build a high bridging social capital do not harm their internal information exchange. At the individual level, the study showed that individuals with a high bonding social capital receive less retweets from people outside the group and that individuals with a high bridging social capital receive less retweets from people within the group (i.e., group members).

Social Networks and Behavioral Change SUN.AM1

Social Networks and Behavioral Change SUN.AM1

Personal support networks and social capital among treated drug addicts

Daria Panebianco, Alma Mater Studiorum, University of Bologna, Owen Gallupe, Peter Carrington, Ivo Colozzi

Contact: daria.panebianco2@unibo.it

ABSTRACT The current study provides a descriptive overview of features of the personal support networks of Italian drug users after long-term residential therapeutic treatment. We measured ego-centered networks in a sample of 80 treated addicts, and investigated which characteristics of support networks (network structural features, relational properties, types of resources mobilized) are related to post-treatment substance use. Furthermore, we explored the role of social capital in terms of the advantages due to ego's location in the structure of relationships as an opportunity to reach more and diverse benefits protective against drug abuse. The results show that lower risk of relapse is positively associated with network reciprocity, alters' socio-economic status, reputational resources, and occupational heterogeneity. Social capital as a function of "brokerage opportunity" contributes to maintaining abstinence through enhanced access to information in less homogeneous personal networks and exposure of treated drug users to greater creative ideas and chances. Implications for designing and implementing more effective post-treatment relapse prevention programs are discussed.

Social Networks and Behavioral Change SUN.AM1

The Role of Social Networks in a Family-Based Weight Reduction Program

Miruna Petrescu-Prahova, University of Washington, Katherine Stovel, Paula Lozano

Contact: mirunapp@uw.edu

Adults participating in a family-based intervention targeting their overweight children were asked to report on the composition and structure of their naturally occurring social networks at week 0 and week 20. We observed a great deal of variation in the size, structure, and composition of social networks of the participants at baseline, and minimal compositional change during the course of the intervention. However, respondents report substantial change in the physical activity levels and eating behaviors of members of their networks over time. In this paper, we rely on triadic network measures to examine how the structure of social

networks relates to experiences of the weight-management program, including ability to complete the program, adult and child weight changes, and subjective assessments of family-based obesity treatment. We focus particularly on how ideas and perceptions about healthy behaviors spread in local networks, and how being caught 'between' healthy and less healthy alters impacts participants' efforts at behavior change. We discuss implications for improving the prospects for the long-term success of weight management strategies.

Social Networks and Health SUN.AM1

Social Networks and Health SUN.AM1

Linking Social Networks and Hormones: Exploring Effects of Network Position and Network Selection Processes

Olga Kornienko, Arizona State University, Katherine Clemans, Dorothee Out, Douglas Granger

Contact: olga.kornienko@asu.edu

We explored links between social network position and processes and individual differences in the levels of salivary cortisol and testosterone. Networks emerge as a result of individuals' pursuing fundamental goals to belong and maintain status. We hypothesized that network position and dynamics would be associated with individual differences in cortisol and testosterone because these hormones mediate behaviors underlying the affiliation and status-oriented processes. Participants were volunteers from a cohort of students ($n=74$; 93% female; Mage=27) from a nationally-ranked nursing program. Saliva was collected simultaneously from all participants in a group setting and was assayed for cortisol and testosterone. Participants also nominated friends. Individuals with the lowest outdegree and higher indegree had higher cortisol levels. ERGM revealed that moderate cortisol levels and moderately high testosterone levels were associated with more sociality. Decades of research reveal reciprocal relationships between hormones and social behavior suggesting that the expression of hormone-behavior associations is dependent on social context. Our findings are noteworthy at a theoretical level because they suggest (for the first time to our knowledge) that individual differences in testosterone and cortisol are also associated with the selection processes in social networks.

Social Networks and Health SUN.AM1

Networks and Clinical Trial Participation: Who Shows Up?

Ann McCranie, Indiana University Bloomington, Bernice Pescosolido

Contact: amccrani@indiana.edu

The Teamwork, Clinical Culture, and Change Study (TC3) focuses on a large public neonatal intensive care unit in the middle of major organizational change, the move from "open bay" units for babies to individual rooms. Amidst this dramatic shift in workplace structure (in both spatial and social senses), staff participated in a clinical trial of a simulation based training to improve teamwork in a neonatal resuscitation event. This ongoing clinical translational research study examines at how network position affects participation and performance in the clinical

trial. Clinical and administrative staff completed face-to-face interviews about network ties, team performance, organizational culture and climate, and orientation to change (N=257, 87% response). Separately, some individuals chose to participate in the ongoing clinical trial. Our study shows that participation in this trial was associated with network position and pre-existing social ties in the NICU unit. Knowledge about existing social relationships in workplaces should inform studies of change efforts, particularly in the ability to understand barriers to the adoption of improvements to the health care system.

Social Networks and Health SUN.AM1

Do social networks cause cancer?

Maksim Tsvetovat, Open Cancer Network, Cristina Metgher

Contact: maksim@tsvetovat.org

Most likely not, but we got your attention! Since late 1970s, a number of small-scale studies have shown some correlation between probability of dying from cancer and a certain set of personality traits, known as the Type C. Described as passive, accepting of their circumstances, and repressing emotions, people expressing Type C traits had larger and faster growing tumors, and did not respond to treatments as well as people expressing Type A personality traits (proactive, engaged, taking control). (Temoshok, 1979). While the clinical findings of Temoshok were summarily dismissed by the medical community as new-age junk, the evidence that personality traits have some effect on growth and treatment resistance of tumors continues to mount. Most recently, a survey of 46000 women conducted by the Army of Women foundation found strong correlations that, in many ways, confirm initial findings of Dr. Temoshok. In our work, we are attempting to add to the body of evidence by conducting a large-scale study based on self-reported health outcomes in social media. We compile an extensive dataset linking linguistic markers to personality traits, and analyze appearance of these markers in tweets posted by cancer patients (self-identified in their profiles or tweet text), in comparison to a control group of self-reported healthy people. We compile histories for the experimental and control group by querying historical tweets for both groups, going back to inception of each account. Does the "cancer personality" theory hold water, when studied on a truly large scale? What can we learn how a patients' treatment progresses from their social media behavior? Can we predict the outcome? Finally... will we find a contagion process among friends of the patient?
